FEDERAL REGISTER

VOLUME 34 • NUMBER 29

Wednesday, February 12, 1969 • Washington, D.C.

PART II

Department of Transportation

Coast Guard

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Transportation or Stowage of Explosives or Other Dangerous Articles or Substances and Combustible Liquids on Board Vessels

Miscellaneous Amendments

Title 46—SHIPPING

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER N—DANGEROUS CARGOES

[CGFR 68-142]

PART 146—TRANSPORTATION OR STOWAGE OF EXPLOSIVES OR OTHER DANGEROUS ARTICLES OR SUBSTANCES, AND COMBUSTIBLE LIQUIDS ON BOARD VESSELS

Miscellaneous Amendments

1. Pursuant to the notice of proposed rulemaking published in the FEDERAL REGISTER of February 29, 1968 (33 F.R. 3564-3570), and the Merchant Marine Council Public Hearing Agenda dated March 25, 1968 (CG-249), the Merchant Marine Council held a public hearing on March 25, 1968, for the purpose of receiving comments, views, and data. The proposals considered were identified as Items PH 1-68 to PH 8-68, inclusive. Item PH 2-68 contained the proposals regarding dangerous cargoes (CG-249, pages 121 to 182, inclusive). This document contains miscellaneous amendments to the dangerous cargo regulations, which were identified as Item PH 2c-68 and Item PH 2d-68 (CG-249, pages 124 to 182, inclusive) (33 F.R. 3566), and deal primarily with radioactive materials. Another document (CGFR 68-66) was published in the FEDERAL REGISTER of June 7, 1968 (33 F.R. 8450-8452) setting forth miscellaneous amendments other than those concerning radioactive materials.

2. The written comments received were considered and changes based thereon have been made. Other changes were made in response to written comments submitted to the Department of Transportation on a parallel proposal for 49 CFR Parts 170 to 189, also regarding radioactive materials. The changes (other than those of an editorial nature) made for these reasons are as follows:

a. In § 146.19-1, definitions have been added for Type A and Type B packaging and quantities, and these terms are used throughout Subpart 146.19 for consistency with international usage.

b. A new Transport Group VII is added in § 146.19-5 for consistency with international usage.

c. In § 146.19-14 the allowable quantities of certain transport groups of radioactive material in radioactive devices have been changed.

d. A new § 146.19-25 is added to provide labeling criteria for radioactive materials.

e. Section 146.19-27 is changed to specify performance standards for Type A and Type B packaging.

f. In § 146.19-100, the entry for radioactive devices is amended by requiring the marking to be placed on the inner packaging rather than the outside packaging, for consistency with international practice.

3. The Hazardous Materials Regulations of the Department of Transportation (49 CFR Parts 170-189) (formerly of the Interstate Commerce Commission in 49 CFR Parts 71-90) and the Dangerous Cargo Regulations (46 CFR Parts 146 and 147) refer in many places to "Interstate Commerce Commission" and "I.C.C." in safety regulatory requirements. The I.C.C. regulations were redesignated as DOT regulations upon the establishment of the Department of Transportation pursuant to 49 U.S.C. 1657, effective April 1, 1967. Because it is impracticable at this time to change all references to the I.C.C., such references are deemed to have the same purpose and meaning as references to the "Department of Transportation" and to "DOT" in the Dangerous Cargo Regulations. Therefore, packagings with the specification markings "ICC" placed thereon may be continued in service as marked.

4. The provisions of R.S. 4472, as amended (46 U.S.C. 170), require that the land and water regulations governing the transportation of dangerous articles or substances shall be as nearly parallel as practicable. The provisions in 46 CFR 146.02-18 and 146.02-19 make the Dangerous Cargo Regulations applicable to all shipments of dangerous cargoes by vessels. The Department of Transportation, through the Hazardous Materials Regulations Board, prescribes the implementing regulations for "hazardous materials" under the statutory authority in sections 831 through 835 of title 18, United States Code. These hazardous materials regulations are published in 49 CFR Parts 171 through 189 (formerly ICC regulations published in 49 CFR Parts 70 to 90). Various amendments to the Dangerous Cargo Regulations in 46 CFR Part 146 have been included in this document in order that these regulations governing water transportation of certain dangerous cargoes will be as nearly parallel as practicable with the regulations which govern the land transportation of the same commodities.

5. The amendments to 46 CFR Part 146, which were not described in the FEDERAL REGISTER notice of proposed rule making published on February 29, 1968 (33 F.R. 3566, 3567), are considered to be interpretations of law, or revised requirements to agree with existing regulations, or editorial in nature, and it is hereby found that compliance with the Administrative Procedures Act (5 U.S.C. 551-559) (respecting notice of proposed rule making, public rule making procedures thereon, and effective date requirements thereof) is unnecessary with respect to such changes.

6. By virtue of the authority vested in me as Commandant, U.S. Coast Guard, by section 632 of title 14, United States Code, and the delegation of authority by the Secretary of Transportation in 49 CFR 1.4(a)(2), to promulgate regulations in accordance with the laws cited with the regulations below, the following amendment are prescribed and shall be effective May 1, 1969; however, the regulations in this document may be complied with in lieu of existing requirements prior to that date.

Subpart 146.01—Preface

1. Section 146.01-4 is amended by revising in paragraph (a) Classes 6 and 7 in the list of classifications to read as follows:

§ 146.01-4 Classifications.

(a) * * *

SOLAS 1960 Classifications	*Coast Guard Classifications*
* * *	* * *
Class 6—Poisonous (toxic) and infectious substances.	Poisons: Extremely dangerous poison, Class A. Less dangerous poison, Class B. Tear gas or irritating substances, Class C.
Class 7—Radioactive materials	Radioactive materials.
* * * *	* * * *

Subpart 146.02—General Regulations

2. Section 146.02-9 is revised to substitute "Canadian Transport Commission" for that agency's former name, "Board of Transport Commissioners for Canada." As amended, § 146.02-9 reads as follows:

§ 146.02-9 Canadian shipments.

Shipments of explosives (except commercial Class A explosives) or other dangerous articles or combustible liquids as defined in this subchapter, which are packed, marked, and labeled in conformity with the regulations of the Canadian Transport Commission may be accepted and transported on board vessels within the navigable waters of the United States: *Provided,* That their acceptance and stowage on board the vessel is in accordance with the regulations in this part for the substances involved: *And provided further,* That the bill of lading or other shipping paper carries the certifying statement of the shipper that the goods are packed, marked, and labeled in accordance with the regulation of the Canadian Transport Commission.

3. Section 146.02-10 is revised to read as follows:

§ 146.02-10 Export shipments.

(a) Export shipments of commercial Class A explosives and radioactive materials regardless of whether in interstate transportation prior to delivery to the vessel, shall be packed, marked, labeled, or otherwise in conformity with the Department of Transportation requirements for the transportation of explosives or other dangerous articles in effect at the time of shipment.

(b) Export shipments of explosives or other dangerous articles or combustible liquids (except commercial Class A explosives and radioactive materials) may

be accepted for transportation when packed, marked, labeled, and described in accordance with the regulations of the country of destination. If the regulations of the foreign country are used, the bill of lading or other shipping paper shall identify such shipments by the shipping name shown in the regulations in this part for the particular substance, and also shall certify that the packing, marking, and labeling is in accordance with the foreign regulations and identify by title or otherwise such foreign regulations. Markings on export packages may be in the language of the country of destination. Labels shall be affixed or printed or stamped upon such export packages when offered for transportation in lots of one hundred (100) or less packages. Stowage on board a vessel shall be in accordance with the regulations in this part as applicable to the particular character of vessel.

4. Section 146.02–11 is revised to read as follows:

§ 146.02–11 Import shipments.

(a) Import shipments of commercial Class A explosives and radioactive materials regardless of whether destined upon arrival at domestic ports for further transportation or not shall be packaged, marked, labeled, or otherwise in conformity with the Department of Transportation requirements for the transportation of explosives or other dangerous articles in effect at the time of shipment.

(b) Import shipments of explosives or other dangerous articles (except commercial Class A explosives and radioactive materials) destined upon arrival at domestic ports for further transportation outside the port area in original packaging, by common, contract, or private carrier must comply with the Department of Transportation regulations for the transportation of explosives or other dangerous articles in effect at the time of shipment. The importer shall furnish with the order to the foreign shipper, and also to the forwarding agent at the port of entry, full and complete information as to packaging, marking, labeling, and other requirements as prescribed by the Department of Transportation regulations (see § 146.05–14).

(c) Import shipments of explosives or other dangerous articles or combustible liquids (except commercial Class A explosives and radioactive materials) accepted for transportation in a foreign port in outside metal or wooden barrels or drums not exceeding 110 gallons capacity, wooden boxes not exceeding 300 pounds weight of box and contents, or fiberboard boxes not exceeding 65 pounds weight of box and contents, which upon arrival at domestic ports are not destined for transportation outside the port area in their original import packaging by common, contract, or private carrier may be carried on board vessels provided the shipper certified upon the bill of lading or other shipping paper that the packaging, marking, and labeling are in conformity with the regulations of the country of origin. If the country of origin has no regulations governing the transportation by vessel of the explosives and dangerous substances involved packages of the type described above in this paragraph may be carried on board vessels: *Provided*, That the shipper shall certify that the container is so constructed as to maintain its complete integrity under all conditions likely to be encountered in transportation. The master of the vessel, before accepting such import shipments, shall satisfy himself that the packaging is sufficiently strong to stand, without rupture or leakage of contents, all risks ordinarily incident to transportation. Stowage of import shipments on board vessels shall be in accordance with the provisions of the regulations in this part.

(d) Shipments of explosives or other dangerous articles or combustible liquids (except commercial Class A explosives and radioactive materials) accepted for transportation in a foreign port which upon arrival at domestic ports are destined for transshipment on vessels subject to the regulations of this part, may be accepted on such vessels provided the bill of lading or other shipping paper identifies the shipment by the shipping name shown in the regulations in this part for the particular substance and provided further that the dangerous cargo is certified to be described as above and to be packaged, marked and labeled in accordance with the regulations in this part or the regulations of the country of origin of the cargo (provided such regulations are compatible with minimum safety requirements of the regulations in this part). The connecting carrier, before accepting such transshipments, shall satisfy himself that the provisions of this paragraph are complied with. The master of the vessel shall satisfy himself that the packaging is sufficiently strong to withstand, without rupture or leakage of contents, all risks incident to transportation. Stowage on board vessels shall be accordance with the provisions of the regulations in this part.

5. Section 146.02–13 is amended by revising paragraph (b) to read as follows:

§ 146.02–13 Report fires.

* * * * *

(b) In the event of wreck, fire, or other disaster involving radioactive materials other than low specific activity materials, or that part of a vessel where radioactive materials other than low specific activity materials are stowed, safety precautions shall be observed in accordance with the applicable regulations in Subpart 146.19 pertaining to the care following leakage or sifting of radioactive materials.

6. Section 146.02–14 is amended by revising the heading and paragraphs (b) and (c) to read as follows:

§ 146.02–14 Damaged packages.

* * * * *

(b) Any damaged outside packaging as described in paragraph (a) of this section, except those containing radioactive materials other than low specific activity materials, may be accepted when restored or repaired to the satisfaction of the owner or master of the vessel. Special attention shall be given to packaging of substances that are required by the regulations of this part to be shipped "wet" to be certain that any escaped liquid is replaced before the restored packaging is accepted.

(c) Damaged, leaking, or insecure outside packaging in which radioactive materials other than low specific activity materials are packaged shall be handled in accordance with the safety precautions set forth in Subpart 146.19 pertaining to the care following leakage or sifting of radioactive materials.

* * * * *

7. Section 146.02–15 is amended by revising paragraph (c) to read as follows:

§ 146.02–15 Emergency shipments.

* * * * *

(c) Notwithstanding the provisions of paragraphs (a) and (b) of this section, when radioactive materials other than low specific activity materials are involved the safety precautions set forth in Subpart 146.19, pertaining to the care following leakage or sifting of radioactive materials, shall be followed whenever practicable.

8. Section 146.02–18 is amended by revising paragraph (a) to read as follows:

§ 146.02–18 Shipments via common carrier vessels.

(a) Regulations promulgated by the Department of Transportation under the title of "Explosives and Other Dangerous Articles" in effect at the time of shipment with respect to definitions, descriptions, descriptive names and classifications of explosives, flammable liquids, flammable solids, oxidizing materials, corrosive liquids, compressed gases, radioactive materials, and poisonous articles; and with respect to specifications of containers for such articles and with respect to the packaging, marking, labeling, and certification of such articles are adopted and form part of the regulations in this part and shall be complied with by all persons packing and preparing, and all shippers offering such articles for transportation by vessels that are common carriers: *Provided, however*, That the acceptance on board vessels of packages laden with such articles or bulk shipments of such articles shall comply with the provisions of the regulations in this part. Import or export shipments of such articles shall comply with the provisions of §§ 146.02–10 and 146.02–11.

* * * * *

9. Section 146.02–19 is amended by revising paragraph (a) to read as follows:

§ 146.02–19 Shipments via vessels other than common carriers.

(a) Explosives or other dangerous articles or substances packed in barrels, drums, boxes, cylinders, carboys or bags and offered for transportation or storage on board vessels that are not common carrier vessels shall with respect to definitions, descriptions, descriptive names and classifications of explosives, flammable liquids, oxidizing materials, corrosive liquids, compressed gases, radioactive materials, and poisonous articles,

and with respect to specifications of containers for such articles or substances, and with respect to the packaging, marking, labeling, and certification of such articles or substances conform to the requirements of the regulations in effect at the time of shipment as promulgated by the Department of Transportation under the title of "Explosives and Other Dangerous Articles" (49 CFR Parts 170–189) except as may be otherwise required by the regulations in this part. Import or export shipments of such articles or substances shall comply with the provisions of §§ 146.02–10 and 146.02–11.

* * * * *

10. Section 146.02–21 is revised to read as follows:

§ 146.02–21 Statements of characteristic properties.

In the second column of the tables shown in §§ 146.19–100, 146.20–100, 146.20–200, 146.20–300, 146.21–100, 146.22–100, 146.22–200, 146.23–100, 146.24–100, 146.25–100, 146.25–200, 146.25–300, 146.26–100, and 146.27–100 are statements in italics setting forth certain characteristic properties of the substances listed therein. It is not intended that these statements set forth all the characteristic properties of a particular substance and such statements as are shown are informative only.

Subpart 146.03—Definitions of Words and Terms Contained Within the Regulations in This Subchapter

11. Section 146.03–8 is revised to read as follows:

§ 146.03–8 Dangerous articles defined.

A dangerous article within the meaning of the regulations in this subchapter is an article falling within any of the following classifications:

Explosives.
Inflammable Liquids.
Inflammable Solids and Oxidizing Materials.
Corrosive Liquids.
Compressed Gases.
Poisons.
Radioactive Materials.
Hazardous Articles.
Ships' Stores and Supplies of a Dangerous Nature.

For definitions covering these classifications see the appropriate section within this subchapter. These are §§ 146.19–1, 146.20–1, 146.20–11, 146.21–1, 146.22–1, 146.23–1, 146.24–1, 146.25–1—146.25–15, 146.27–1, and 147.02–1, 147.02–2. Combustible Liquids are defined in § 146.26–1.

12. Section 146.03–17 is revised to read as follows:

§ 146.03–17 ICC or DOT.

The initials "ICC" refer to Interstate Commerce Commission. The initials "DOT" refer to Department of Transportation. For the purposes of the regulations in this subchapter ICC and DOT are used interchangeably with respect to safety regulatory functions formerly performed by the Interstate Commerce Commission and now performed by the Department of Transportation pursuant to 49 U.S.C. 1657.

13. Section 146.03–18 is revised to read as follows:

§ 146.03–18 ICC and DOT regulations.

The terms "ICC regulations" and "DOT regulations" when used in the regulations in this part refer to regulations of the Interstate Commerce Commission (49 CFR Parts 71–90) or the Department of Transportation (49 CFR Parts 170–189) in effect at the time a shipment is moving and subject to the regulations in this part. The ICC regulations were redesignated as DOT regulations upon the establishment of the Department of Transportation pursuant to 49 U.S.C. 1657 effective April 1, 1967; therefore, references in this part to ICC regulations shall be understood to include the DOT regulations which superseded the ICC regulations.

14. Section 146.03–19 is amended by revising the heading and paragraph (b) to read as follows:

§ 146.03–19 Inside packaging.

* * * * *

(b) The inside packaging and packing, if required, shall comply with the requirements of the Department of Transportation in effect at the time of shipment.

15. A new § 146.03–27a is added, to read as follows:

§ 146.03–27a Packaging.

"Packaging" means the assembly of the containers and any other components necessary to ensure compliance with the containment requirements prescribed for the substances therein.

16. A new § 146.03–27b is added, to read as follows:

§ 146.03–27b Package.

"Package" means the packaging plus its content of explosives or other dangerous articles as presented for transportation.

17. A new § 146.03–40 is added, to read as follows:

§ 146.03–40 Transport vehicle.

"Transport vehicle" means the conveyance used for the transportation of explosives or other dangerous articles and includes any motor vehicle, rail car, or aircraft. Each cargo-carrying body (trailer, van, box car, etc.) is a separate vehicle.

Subpart 146.04—List of Explosives or Other Dangerous Articles Containing the Shipping Name or Description of Articles Subject to the Regulations in This Subchapter

§ 146.04–4 [Amended]

18. Section 146.04–4 is amended by revising the entry in the list from "Pois. D.....Radioactive Material, Class D" to read "R.A.M.....Radioactive Material."

19. Section 146.04–5 is amended by changing, adding, and canceling certain items as follows:

§ 146.04–5 List of explosives and other dangerous articles and combustible liquids.

Article	Classed as—	Label required
Change		
Fissile radioactive materials	Radioactive	Radioactive.
Radioactive devices	Radioactive	
Radioactive materials, low specific activity (LSA)	Radioactive	Radioactive.
Add		
Radioactive materials, small quantities	Radioactive	
Radioactive materials, N.O.S.	Radioactive	Radioactive.
Radioactive materials, special form	Radioactive	Radioactive.
Thorium nitrate, solid	Radioactive, Oxy. M.	Radioactive and yellow.
Uranyl nitrate, solid	Radioactive, Oxy. M.	Radioactive and yellow.
Cancel		
Magnesium-thorium alloys in formed shapes (not powdered, and which shall contain not more than 4 percent nominal thorium-232) (see: § 146.25–25(e)).	Pois. D	Radioactive materials, red special.
Radioactive materials, Groups I, II, and IV	Pois. D	Radioactive materials, red.
Radioactive materials, Group III	Pois. D	Radioactive materials, blue.
Radioactive materials, N.O.S. (see: "Radioactive materials, Groups I, II, and IV" or "Group III").	Pois. D	Radioactive materials, red or blue.
Uranium, normal or depleted, in solid metal form (not borings, chips, or pieces) (see: § 146.25–25(f)).	Pois. D	Radioactive materials, red special.

Subpart 146.05—Shipper's Requirements Re: Packing, Marking, Labeling, and Shipping Papers

20. Section 146.05–4 is revised to read as follows:

§ 146.05–4 Prescribed packaging.

(a) The rgulations in this subchapter prescribe four groups of outside packaging for use in shipping permitted explosives or other dangerous articles or substances as follows:

(1) DOT and ICC specification packaging.

(2) M.I.N. specification packaging. (See § 146.05–7.)

(3) C.F.C. specification packaging. (See § 146.05–7.)

(4) Nonspecification packaging.

(b) In the interest of national defense or at such times as it shall be determined that the interest of safety would not be impaired, the use of packagings other than those specified in this part, for the transportation of permitted explosives and other dangerous articles or substances may be authorized in the discretion of and upon special permit to be

issued by the Commandant of the Coast Guard.

CROSS REFERENCE: For Canadian shipments, see § 146.02–9.

21. Section 146.05–5 is amended by revising the heading and paragraph (a) to read as follows:

§ 146.05–5 DOT and ICC specification packaging.

(a) Department of Transportation and Interstate Commerce Commission packaging authorized herein for use in the transportation of permitted explosives or other dangerous articles or substances must have been made and marked in compliance with specifications prescribed by the Department of Transportation or the Interstate Commerce Commission in effect at the date of manufacture of the packaging. References in the regulations of this subchapter to the Interstate Commerce Commission and ICC shall be understood to include the Department of Transportation and DOT, respectively.

* * * * *

22. Section 146.05–11 is amended by revising paragraphs (a), (d), and (e), by revoking paragraphs (b) and (c), and by redesignating (d) and (e) as (b) and (c). As amended, § 146.05–11 reads as follows:

§ 146.05–11 Certification.

(a) Each shipper offering for transportation by water any explosives, other dangerous articles, combustible liquids, and hazardous articles subject to the regulations in this part must show on the shipping paper the following certificate which must be signed by the shipper:

This is to certify that the above-named articles are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

(b) For export and import shipments of dangerous cargo not destined to be transported by land under the jurisdiction of the Department of Transportation as covered in § 146.02–10 of this part, the shipper may certify on the bill of lading or other shipping paper that the dangerous articles are properly packaged, marked, labeled, and are in proper condition for transportation according to the regulations of the country of origin or destination as the case may be. The regulations must be identified by name.

(c) Detailed regulations in §§ 146.21–100 to 146.27–100 require specific certification for certain substances. When these substances are required to be certificated under paragraph (a) of this section the certificate required by the detailed regulations shall be in addition thereto.

23. Section 146.05–12 is amended by revising paragraph (f)(6) and by adding a new paragraph (f)(9) which read as follows:

§ 146.05–12 Originating shipping order, transfer shipping paper.

* * * * *

(f) The minimum information required by this section to be shown upon an originating shipping order is as follows:

* * * * *

(6) In connection with the entry of each dangerous article, show the kind and color of label applied to the package or the markings upon the package when label or marking is required by the regulations in this part. Where the detailed regulations exempt the packages from labeling the exemption must be indicated by the words "No Label Required" immediately following the description on the shipping paper.

* * * * *

(9) For shipments of radioactive materials, the shipping paper description must include:

(i) The Transport Group or Groups of the radionuclides in the radioactive material, if the material is in normal form;

(ii) The name of the radionuclides in the radioactive material, and a description of its physical and chemical form if the material is in normal form;

(iii) The activity of the radioactive material in curies;

(iv) The type of label applied to the package; i.e., Radioactive White–I, Radioactive Yellow–II, or Radioactive Yellow–III;

(v) For fissile radioactive materials, the fissile class of the package, and the weight in grams or kilograms of the fissile isotope; and

(vi) For export shipments, a copy of any special permit issued by the Department of Transportation for the package.

* * * * *

24. Section 146.05–15(g) revised to read as follows:

§ 146.05–15 Marking and labeling.

* * * * *

(g) Each package containing "Any Other Dangerous Article" as defined by the regulations in this part shall be conspicuously labeled by the shipper as follows except as otherwise provided:

(1) "Red" label as described and illustrated in § 146.05–17(f) on packages of flammable liquids, except when exempted by the regulations in this part. If flammable liquid is also a Class A poison or a radioactive material, the "poison gas" label or "radioactive" label must also be applied to the package.

(2) "Yellow" label as described and illustrated in § 146.05–17(g) on packages of flammable solids and oxidizing materials, except when exempted by the regulations in this part. If flammable solid or oxidizing material is also a Class A poison or a radioactive material, the "poison gas" label or "radioactive" label must also be applied to the package.

(3) "White" label as described and illustrated in § 146.05–17(h) on packages of acids, except when exempted by the regulations in this part. If the acid is also a Class A poison or a radioactive material, the "poison gas" label or "radioactive" label must also be applied to the package.

(4) "White" label as described and illustrated in § 146.05–17(j) on packages of corrosive liquids, except when exempted by the regulations in this part. If the corrosive liquid is also a Class A poison or a radioactive material, the "poison gas" label or "radioactive" label must also be applied to the package.

(5) "White" label as described and illustrated in § 146.05–17(k) on packages of alkaline caustic liquids, except when exempted by the regulation in this part. If the alkaline caustic liquid is also a Class A poison or a radioactive material, the "poison gas" label or "radioactive" label must also be applied to the package.

(6) "Red" label as described and illustrated in § 146.05–17(l) on packages of flammable compressed gases, except when exempted by the regulations in this part. If the flammable compressed gas is also a Class A poison or a radioactive material, the "poison gas" label or the "radioactive" label must also be applied to the package.

(7) "Green" label as described and illustrated in § 146.05–17(m) on packages of nonflammable compressed gases except when exempted by the regulations in this part. If the nonflammable compressed gas is also a Class A poison or a radioactive material, the "poison gas" label or "radioactive" label must also be applied to the package.

(8) "Poison gas" label as described and illustrated in § 146.05–17(n) on packages of Class A poisons.

(9) "Poison" label as described and illustrated in § 146.05–17(o) on containers of Class B poison liquids or solids, except when exempted by the regulations in this part. If the Class B poison liquid or solid is also a radioactive material the "radioactive" label must also be applied to the package.

(10) "Tear gas" label as described and illustrated in § 146.05–17(p) on packages of Class C poisons.

(11) "Radioactive" (white–I, yellow–II, or yellow–III) label as described in § 146.05–17 (q) and (r) on packages of radioactive materials, except when exempted from the labeling requirements in Subpart 146.19 of this part. Each package must be labeled with two such labels, affixed to opposite sides of the package. The method of determination of which label to use is given in § 146.19–25.

(12) Labels which conform to the model prescribed in the regulations of the International Atomic Energy Agency, and which are similar in appearance to the labels prescribed in this part (although the inscriptions on the labels may be in a foreign language) are authorized in place of the labels prescribed in this part for import or export shipments only.

(13) "Bung" label as described and illustrated in § 146.05–17(v) on metal barrels or drums containing flammable liquids with vapor pressures exceeding 16 pounds per square inch absolute.

(14) "Empty" label as described and illustrated in § 146.05–17(u) shall be applied to packages which have been emptied and on which the old label has not been removed, obliterated, or destroyed. It must be placed on the package so as to completely cover the old label.

* * * * *

25. Section 146.05–16 is revised to read as follows:

§ 146.05–16 Labels for mixed packing.

(a) Use the red label only when red and other labels are prescribed, except when poison gas label or radioactive label is prescribed, then both the red label and the poison gas label or red label and radioactive label must be used.

(b) Use white acid (alkaline caustic liquid or corrosive liquid) label only when white acid (alkaline caustic liquid or corrosive liquid) and yellow or poison labels are prescribed or poison labels (Class B) are prescribed except when poison gas label or radioactive label is prescribed, then both the white acid label and the poison gas label or white acid and radioactive label must be used.

26. Section 146.05–17 is amended by revising paragraphs (q) and (r) and by revoking paragraph (w) to read as follows:

§ 146.05–17 Labels.

* * * * *

(q) "Radioactive white–I" label for radioactive materials. Label must be white in color. The single vertical bar on the lower half of the label must be bright red in color.

(r) (1) "Radioactive yellow–II" label for radioactive materials. The upper half of the label must be bright yellow and the bottom half must be white. The two vertical bars on the lower half of the label must be bright red in color.

(2) "Radioactive yellow–III" label for radioactive materials. The upper half of the label must be bright yellow and the bottom half must be white. The three vertical bars on the lower half of the label must be bright red in color.

* * * * *

(w) [Revoked]

Subpart 146.07—Railroad Vehicles, Highway Vehicles, Vans, or Portable Containers Loaded With Explosives or Other Dangerous Articles and Transported on Board Ocean Vessels

27. Section 146.07–20 is revised to read as follows:

§ 146.07–20 Certification.

The shipping order or other memorandum furnished by the shipper, agent or delivering carrier shall bear the following certificate of the shipper or his duly authorized agent:

This is to certify that the above-named articles are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

Subpart 146.10—Barges

§ 146.10–50 [Amended]

28. In § 146.10–50, the table is amended as follows:

A. In column 1 under the entry "Poisonous articles" delete the words:
Class "D."

B. In column 2, opposite the entry "Poisonous articles," delete the words:
"Radioactive Materials."

C. After the entry "Poisonous articles: Class 'A', Class 'B', Class 'C' " and before the entry "Hazardous articles," add a new entry as follows:

(1) In column 1, add:
Radioactive materials.

(2) In column 2, add:
Radioactive.

(3) In column 3, add:
Yes.[1]

(4) In column 4, add:
Yes.[1]

(5) In column 5, add:
Yes.

(6) In column 6, add:
On deck only.[1]

(7) In column 7, add:
Yes.

(8) In column 8, add:
Yes.[1]

(9) In column 9, add:
No.

(10) In column 10, add:
Yes.[1 4]

(11) In column 11, add:
Yes.[3 6]

(12) In columns 12 through 15 add:
No.

(R.S. 4405, as amended, 4462, as amended, 4472, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 170, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). Interpret or apply sec. 3, 68 Stat. 675; 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

29. A new Subpart 146.19, consisting of §§ 146.19–1 through 146.19–100, is added to read as follows:

Subpart 146.19—Detailed Regulations Governing Radioactive Materials

Sec.

146.19–1	Radioactive materials; definitions.
146.19–5	Transport groups of radionuclides.
146.19–10	General packaging requirements.
146.19–11	Empty packaging.
146.19–12	Fissile radioactive material.
146.19–14	Small quantities of radioactive materials and radioactive devices.
146.19–16	Low specific activity materials.
146.19–18	Radioactive material in normal form.
146.19–20	Radioactive material in special form.
146.19–25	Labeling of packages of radioactive materials.
146.19–27	Special tests.
146.19–30	Contamination control.
146.19–35	Stowage and handling aboard vessels.
146.19–40	Segregation from other cargoes.
146.19–50	Care following leakage or sifting of radioactive materials.
146.19–70	Use of power-operated industrial trucks in spaces containing radioactive materials.
146.19–80	Vessels utilizing nuclear energy or handling radioactive materials.
146.19–100	Table—Classification: Radioactive materials.

AUTHORITY: The provisions of this Subpart 146.19 issued under R.S. 4405, as amended, 4462, as amended, 4472, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 170, 49 U.S.C. 1655(b); 49 CFR 1.4(a)(2). Interpret or apply sec. 3, 68 Stat. 675; 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

§ 146.19–1 Radioactive materials; definitions.

For the purpose of this subchapter:

(a) "Fissile radioactive material" means the following material: Plutonium-238, plutonium-239, plutonium-241, uranium-233, or uranium-235, or any material containing any of the foregoing materials. Fissile radioactive material packages are classified according to the

controls needed to provide nuclear criticality safety during transportation as follows:

(1) *Fissile Class I.* Packages which may be transported in unlimited numbers and in any arrangement, and which require no nuclear criticality safety controls during transportation. For purposes of nuclear criticality safety control, a transport index is not assigned to Fissile Class I packages. However, the external radiation levels may require a transport index number.

(2) *Fissile Class II.* Packages which may be transported together in any arrangement but in numbers which do not exceed an aggregate transport index of 50. For purposes of nuclear criticality safety control, individual packages may have a transport index of not less than 0.1 and not more than 10. However, the external radiation levels may require a higher transport index number but not to exceed 10. Such shipments require no nuclear criticality safety control by the shipper during transportation.

(3) *Fissile Class III.* Shipments of packages which do not meet the requirements of Fissile Classes I or II and which are controlled to provide nuclear criticality safety in transportation by special arrangements between the shipper and the carrier.

NOTE 1: Uranium-235 exists only in combination with various percentages of uranium-234 and uranium-238. "Fissile radioactive material" as applied to uranium-235 refers to the amount of uranium-235 actually contained in the total quantity of uranium being transported.

NOTE 2: Radioactive material may consist of mixtures of fissile and nonfissile radionuclides. "Fissile radioactive material" refers to the amount of plutonium-238, plutonium-239, plutonium-241, uranium-233, uranium-235, or any combination thereof actually contained in the mixture. The "radioactivity" of the mixture consists of total activity of both the fissile and nonfissile radionuclides. All mixtures containing "fissile material" shall be subject to § 146.19–12.

(b) "Full load" means any load:

(1) From a single consignor having the sole use of a vehicle, van, or portable container or of a hold, compartment, or defined deck area of a vessel.

(2) In respect of which all terminal and intermediate loading and unloading is carried out in accordance with the instructions of the consignor or the consignee.

Unless otherwise specified in the regulations in this subpart, such a load may consist of radioactive materials of different kinds in packages which may be accompanied by nonradioactive materials for which mixed loading with radioactive material is not prohibited.

(c) "Large quantity radioactive materials" means a quantity the aggregate radioactivity of which exceeds that specified as follows:

(1) Group I or II (see paragraph (j) of this section) radionuclides; 20 curies.

(2) Group III or IV radionuclides: 200 curies.

(3) Group V radionuclides: 5,000 curies.

(4) Group VI or VII radionuclides: 50,000 curies.

(5) Special form material: 5,000 curies.

(d) "Low specific activity material" means any of the following:

(1) Uranium or thorium ores and physical or chemical concentrates of those ores;

(2) Unirradiated natural or depleted uranium or unirradiated natural thorium;

(3) Tritium oxide in aqueous solutions provided the concentration does not exceed 5 millicuries per milliliter;

(4) Material in which the activity is essentially uniformly distributed and in which the estimated average concentration per gram of contents does not exceed:

(i) 0.0001 millicuries of Group I (see § 146.19–5) radionuclides; or

(ii) 0.005 millicuries of Group II radionuclides; or

(iii) 0.3 millicuries of Groups III or IV radionuclides.

NOTE: This includes, but is not limited to, materials of low radioactivity concentration such as residues or solutions from chemical processing; wastes such as building rubble, metal, wood, and fabric scrap, glassware, paper, and cardboard; solid or liquid plant waste, sludges, and ashes.

(5) Objects of nonradioactive material externally contaminated with radioactive material: *Provided,* That the radioactive material is not readily dispersible and the surface contamination when averaged over an area of 1 square meter, does not exceed 0.0001 millicurie (220,000 disintegrations per minute) per square centimeter of Group I radionuclides or 0.001 millicurie (2,200,000 disintegrations per minute) per square centimeter of other radionuclides.

(e) "Normal form radioactive materials" means those which are not special form radioactive materials. Normal form radioactive materials are grouped into transport groups (see paragraph (j) of this section).

(f) "Radioactive material" means any material or combination of materials, which spontaneously emits ionizing radiation. Materials in which the estimated specific activity is not greater than 0.002 microcuries per gram of material, and in which the radioactivity is essentially uniformly distributed, are not considered to be radioactive materials.

(g) "Removable radioactive contamination" means radioactive contamination which can be readily removed in measurable quantities by wiping the contaminated surface with an absorbent material. The measurable quantities shall be considered as being not significant if they do not exceed the limits specified in § 146.19–30.

(h) "Special form radioactive materials" means those which, if released from a package, might present some direct radiation hazard but would present little hazard due to radiotoxicity and little possibility of contamination. This may be the result of inherent properties of the material (such as metals or alloys), or acquired characteristics, as through encapsulation. The criteria for determining whether a material meets the definition of special form are prescribed in § 146.19–27(a).

(i) [Reserved]

(j) "Transport group" means any one of seven groups into which normal form radionuclides are classified according to their radiotoxicity and their relative potential hazard in transportation, and as listed in §146.19–5.

(k) "Transport index" means the number placed on a package to designate the degree of control to be exercised by the carrier during transportation. The transport index to be assigned to a package of radioactive materials shall be determined by either subparagraph (1) or (2) of this paragraph, whichever is larger. The number expressing the transport index shall be rounded up to the next highest tenth; e.g., 1.01 becomes 1.1.

(1) The highest radiation dose rate, in millirem per hour at 3 feet from any accessible external surface of the package; or

(2) For Fissile Class II packages only, the transport index number calculated by dividing the number "50" by the number of similar packages which may be transported together (see § 146.19–12) as determined by the procedures prescribed in the regulations of the U.S. Atomic Energy Commission, 10 CFR Part 71.

(l) "Type A packaging" means packaging which is designed in accordance with the general packaging requirements of § 146.19–10 and applicable DOT regulations, and which is adequate to prevent the loss or dispersal of the radioactive contents and to retain the efficiency of its radiation shielding properties if the package is subject to the tests prescribed in § 146.19–27(b).

(m) "Type B packaging" means packaging which meets the standards for Type A packaging, and, in addition, meets the standards for hypothetical accident conditions of transportation as prescribed in § 146.19–27(c).

(n) "Type A quantity" and "Type B quantity" radioactive materials means a quantity the aggregate radioactivity of which does not exceed that specified as follows:

Transport group (see 49 CFR 173.389(h))	Type A quantity (in curies)	Type B quantity (in curies)
I	0.001	20
II	0.05	20
III	3	200
IV	20	200
V	20	5,000
VI and VII	1,000	50,000
Special form	20	5,000

§ 146.19–5 Transport groups of radionuclides.

(a) List of radionuclides:

Element [1]	Radionuclide [2]	Transport group						
		I	II	III	IV	V	VI	VII
Actinium (89)	Ac-227	X						
	Ac-228	X						
Americium (95)	Am-241	X						
	Am-243	X						
Antimony (51)	Sb-122				X			
	Sb-124			X				
	Sb-125			X				
Argon (18)	Ar-37						X	
	Ar-41		X					
	Ar-41 (uncompressed) [3]					X		
Arsenic (33)	As-73				X			
	As-74				X			
	As-76				X			
	As-77				X			
Astatine (85)	At-211			X				
Barium (56)	Ba-131				X			
	Ba-133		X					
	Ba-140			X				
Berkelium (97)	Bk-249	X						
Beryllium (4)	Be-7				X			
Bismuth (83)	Bi-206				X			
	Bi-207			X				
	Bi-210		X					
	Bi-212			X				
Bromine (35)	Br-82				X			
Cadmium (48)	Cd-109				X			
	Cd-115m			X				
	Cd-115				X			
Calcium (20)	Ca-45				X			
	Ca-47				X			
Californium (98)	Cf-249	X						
	Cf-250	X						
	Cf-252	X						
Carbon (6)	C-14				X			
Cerium (58)	Ce-141				X			
	Ce-143				X			
	Ce-144			X				
Cesium (55)	Cs-131				X			
	Cs-134m			X				
	Cs-134			X				
	Cs-135				X			
	Cs-136				X			
	Cs-137			X				
Chlorine (17)	Cl-36			X				
	Cl-38				X			
Chromium (24)	Cr-51				X			
Cobalt (27)	Co-56			X				
	Co-57				X			
	Co-58m				X			
	Co-58				X			
	Co-60			X				
Copper (29)	Cu-64				X			
Curium (96)	Cm-242	X						
	Cm-243	X						
	Cm-244	X						
	Cm-245	X						
	Cm-246	X						
Dysprosium (66)	Dy-154			X				
	Dy-165				X			
	Dy-166				X			
Erbium (68)	Er-169				X			
	Er-171				X			
Europium (63)	Eu-150			X				
	Eu-152m				X			
	Eu-152			X				
	Eu-154		X					
	Eu-155				X			
Fluorine (9)	F-18				X			
Gadolinium (64)	Gd-153				X			
	Gd-159				X			
Gallium (31)	Ga-67			X				
	Ga-72				X			
Germanium (32)	Ge-71				X			
Gold (79)	Au-193			X				
	Au-194			X				
	Au-195			X				
	Au-196				X			
	Au-198				X			
	Au-199				X			
Hafnium (72)	Hf-181				X			
Holmium (67)	Ho-166				X			
Hydrogen (1)	H-3 (see tritium)							
Indium (49)	In-113m				X			
	In-114m			X				
	In-115m				X			
	In-115				X			
Iodine (53)	I-124			X				
	I-125			X				
	I-126			X				
	I-129			X				
	I-131			X				
	I-132				X			
	I-133			X				
	I-134				X			
	I-135				X			
Iridium (77)	Ir-190				X			
	Ir-192			X				
	Ir-194				X			
Iron (26)	Fe-55				X			
	Fe-59				X			
Krypton (36)	Kr-85m			X				
	Kr-85m (uncompressed) [3]						X	
	Kr-85			X				
	Kr-85 (uncompressed) [3]							X
	Kr-87		X					
	Kr-87 (uncompressed) [3]						X	
Lanthanum (57)	La-140				X			
Lead (82)	Pb-203				X			
	Pb-210		X					
	Pb-212		X					
Lutecium (71)	Lu-172			X				
	Lu-177				X			
Magnesium (12)	Mg-28			X				
Manganese (25)	Mn-52				X			
	Mn-54				X			
	Mn-56				X			
Mercury (80)	Hg-197m				X			
	Mg-197				X			
	Hg-203				X			
Mixed Fission Products	MF-P		X					
Molybdenum (42)	Mo-99				X			
Neodymium (60)	Nd-147				X			
	Nd-149				X			
Neptunium (93)	Np-237	X						
	Np-239	X						
Nickel (28)	Ni-56			X				
	Ni-59				X			
	Ni-63				X			
	Ni-65				X			
Niobium (41)	Nb-93m				X			
	Nb-95				X			
	Nb-97				X			
Osmium (76)	OS-185				X			
	OS-191m				X			
	OS-191				X			
	OS-193				X			
Palladium (46)	Pd-103				X			
	Pd-109				X			
Phosphorus (15)	P-32				X			
Platinum (78)	Pt-191				X			
	Pt-193				X			
	Pt-193m				X			
	Pt-197m				X			
	Pt-197				X			

See footnotes at end of table.

Element [1]	Radionuclide [2]	Transport group						
		I	II	III	IV	V	VI	VII
Plutonium (94)	Pu-238 [4]	X						
	Pu-239 [4]	X						
	Pu-240	X						
	Pu-241 [4]	X						
	Pu-242	X						
Polonium (84)	Po-210	X						
Potassium (19)	K-42				X			
	K-43			X				
Praseodymium (59)	Pr-142				X			
	Pr-143				X			
Promethium (61)	Pm-147				X			
	Pm-149				X			
Protactinium (91)	Pa-230	X						
	Pa-231	X						
	Pa-233		X					
Radium (88)	Ra-223		X					
	Ra-224		X					
	Ra-226	X						
	Ra-228	X						
Radon (86)	Rn-220				X			
	Rn-222		X					
Rhenium (75)	Re-183				X			
	Re-186				X			
	Re-187				X			
	Re-188				X			
	Re Natural				X			
Rhodium (45)	Rh-103m				X			
	Rh-105				X			
Rubidium (37)	Rb-86				X			
	Rb-87				X			
	Rb Natural				X			
Ruthenium (44)	Ru-97				X			
	Ru-103				X			
	Ru-105				X			
	Ru-106			X				
Samarium (62)	Sm-145			X				
	Sm-147			X				
	Sm-151				X			
	Sm-153				X			
Scandium (21)	Sc-46			X				
	Sc-47				X			
	Sc-48				X			
Selenium (34)	Se-75				X			
Silicon (14)	Si-31				X			
Silver (47)	Ag-105				X			
	Ag-110m			X				
	Ag-111				X			
Sodium (11)	Na-22			X				
	Na-24				X			
Strontium (38)	Sr-85m				X			
	Sr-85				X			
	Sr-89			X				
	Sr-90		X					
	Sr-91			X				
	Sr-92				X			
Sulphur (16)	S-35				X			
Tantalum (73)	Ta-182			X				
Technetium (43)	Tc-96m				X			
	Tc-96				X			
	Tc-97m				X			
	Tc-97				X			
	Tc-99m				X			
	Tc-99				X			
Tellurium (52)	Te-125m				X			
	Te-127m				X			
	Te-127				X			
	Te-129m			X				
	Te-129				X			
	Te-131m			X				
	Te-132				X			
Terbium (65)	Tb-160				X			
Thallium (81)	Tl-200					X		
	Tl-201					X		
	Tl-202					X		
	Tl-204			X				
Thorium (90)	Th-227			X				
	Th-228		X					
	Th-230		X					
	Th-231		X					
	Th-232				X			
	Th-234		X					
	Th Natural				X			
Thulium (69)	Tm-168				X			
	Tm-170				X			
	Tm-171					X		
Tin (50)	Sn-113					X		
	Sn-117m				X			
	Sn-121				X			
	Sn-125					X		
Tritium (1)	H-3					X		
	H-3 (as a gas, as luminous paint, or adsorbed on solid material).							X
Tungsten (74)	W-181					X		
	W-185					X		
	W-187					X		
Uranium (92)	U-230			X				
	U-232		X					
	U-233 [4]			X				
	U-234			X				
	U-235 [4]				X			
	U-236			X				
	U-238				X			
	U Natural				X			
	U Enriched [4]				X			
	U Depleted				X			
Vanadium (23)	V-48					X		
	V-49				X			
Xenon (54)	Xe-125				X			
	Xe-131m				X			
	Xe-131m (uncompressed) [3]						X	
	Xe-133				X			
	Xe-133 (uncompressed) [3]							X
	Xe-135			X				
	Xe-135 (uncompressed) [3]						X	
Ytterbium (70)	Yb-175					X		
Yttrium (39)	Y-88					X		
	Y-90						X	
	Y-91m					X		
	Y-91					X		
	Y-92						X	
	Y-93						X	
Zinc (30)	Zn-65						X	
	Zn-69m						X	
	Zn-69						X	
Zirconium (40)	Zr-93						X	
	Zr-95					X		
	Zr-97						X	

[1] Atomic number shown in parentheses.
[2] Atomic weight shown after the radionuclide symbol.
[3] Uncompressed means at a pressure not exceeding 14.7 p.s.i. (absolute).
[4] Fissile radioactive material.

(b) Any radionuclide not listed in paragraph (a) of this section shall be assigned to one of the groups in accordance with the following table:

Radionuclide	Radioactive half life		
	1,000 days to over—		
	0–1,000 days	10^6 years	10^6 years
Atomic number 1–81	Group III	Group II	Group III.
Atomic number 82 and over.	Group I	Group I	Do.

NOTE 1.—No unlisted radionuclide shall be assigned to Groups IV, V, VI, or VII.

(c) For mixtures of radionuclides the following shall apply:

(1) If the identity and respective activity of each radionuclide are known, the permissible activity of each radionuclide shall be such that the sum, for all groups present, of the ratio between the total activity for each group to the permissible activity for each group will not be greater than unity.

(2) If the groups of the radionuclides are known but the amount in each group cannot be reasonably determined, the mixture shall be assigned to the most restrictive group present.

(3) If the identity of all or some of the radionuclides cannot be reasonably determined, each of those unidentified radionuclides shall be considered as belonging to the most restrictive group which cannot be positively excluded.

(4) Mixtures consisting of a single radioactive decay chain where the radionuclides are in the naturally occurring proportions shall be considered as consisting of a single radionuclide. The group and activity shall be that of the first member present in the chain, except if a radionuclide "x" has a half-life longer than that of that first member and an activity greater than that of any other member including the first at any time during transportation; in that case, the transport group of the nuclide "x" and the activity of the mixture shall be the maximum activity of that nuclide "x" during transportation.

§ 146.19–10 General packaging requirements.

(a) Unless otherwise specified, all shipments of radioactive materials must meet all requirements of this section, and must be packaged as prescribed in §§ 146.19–10 through 146.19–20 and § 146.19–100.

(b) The outside of each package must incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evidence that the package has not been illicitly opened.

(c) The smallest outside dimension of any package must be 4 inches or greater.

(d) Radioactive materials must be packaged in packagings which have been designed to maintain shielding efficiency and leak tightness, so that, under conditions normally incident to transportation, there will be no release of radioactive material. If necessary, additional suitable inside packaging must be used. Each package must be capable of meeting the standards in § 146.19–27(b). Specification containers listed as authorized for radioactive materials shipments may be assumed to meet those standards, provided the packages do not exceed the gross weight limits prescribed for those containers in the applicable DOT regulations.

(1) Internal bracing or cushioning, where used, must be adequate to assure that, under the conditions normally incident to transportation, the distance from the inner container or radioactive material to the outside wall of the package remains within the limits for which the package design was based, and the radiation dose rate external to the package does not exceed the transport index number shown on the label. Inner shield closures must be positively secured to prevent loss of the contents.

(e) The packaging must be so designed, constructed, and loaded that, when transporting large quantities of radioactive material:

(1) The heat generated within the package because of the radioactive materials present will not, at any time during transportation, affect the efficiency of the package under the conditions normally incident to transportation, and

(2) The temperature of the accessible external surfaces of the package will not exceed 122° F. in the shade when fully loaded, assuming still air at ambient temperature. If the package is transported as full load, the maximum accessible external surface temperature shall be 180° F.

(f) Pyrophoric materials, in addition to the packaging prescribed in this subpart, must also meet the packaging requirements of Subparts 146.21 and 146.22.

(g) Liquid radioactive material must be packaged in or within a leak-resistant and corrosion-resistant inner container. In addition—

(1) The packaging must be adequate to prevent loss or dispersal of the radioactive contents from the inner container, if the package were subjected to the 30-foot drop test prescribed in § 146.19–27(c)(2)(i); or

(2) Enough absorbent material must be provided to absorb at least twice the volume of the radioactive liquid contents. The absorbent material may be located outside the radiation shield only if it can be shown that if the radioactive liquid contents were taken up by the absorbent material the resultant dose rate at the surface of the package would not exceed 1,000 millirem per hour.

(h) There must be no signicant removable radioactive surface contamination on the exterior of the package (see § 146.19–30).

(i) Except for shipments described in paragraph (j) of this section, all radioactive materials must be packaged in suitable packaging (shielded, if necessary) so that at any time during the normal conditions incident to transportation the radiation dose rate does not exceed 200 millirem per hour at any point on the external surface of the package, and the transport index does not exceed 10.

(j) Packages for which the radiation dose rate exceeds the limits specified in paragraph (i) of this section, but does not exceed at any time during transportation any of the limits specified in subparagraphs (1) through (4) of this paragraph, may be transported as a full load if transported in a transport vehicle or van assigned for the sole use of that consignor, and unloaded by the consignee from the transport vehicle or van in which originally loaded.

(1) 1,000 millirem per hour at 3 feet from the external surface of the package (closed transport vehicle only);

(2) 200 millirem per hour at any point on the external surface of the car or vehicle (closed transport vehicle only); and

(3) 10 millirem per hour at 3 feet from the external surface of the car or vehicle.

(k) Packages consigned for export are also subject to the regulations of the foreign governments involved in the shipment.

§ 146.19–11 Empty packaging.

All packagings and accessories which have been used for shipments of radioactive materials and which contain residual internal radioactive contamination, when shipped as empty must be securely closed, the external surface must be free of significant removable radioactive contamination as provided in § 146.19–30(a), and the radiation at the external surface of the packaging must not exceed 0.5 millirem per hour. The "Empty" label, described in § 146.05–17(u) must be affixed to the packaging.

§ 146.19–12 Fissile radioactive material.

(a) The following materials are not classified as fissile radioactive materials, are exempted from this section, and must instead be packaged in accordance with the other provisions of this subpart, as appropriate:

(1) Not more than 15 grams of fissile material;

(2) Thorium, or uranium containing not more than 0.72 percent by weight of fissile material;

(3) Uranium compounds other than metal (e.g., UF_4, UF_6, or uranium oxide in bulk form not pelleted or fabricated into shapes), and aqueous solutions of uranium, in which the total amount of uranium-233 and plutonium present does not exceed 1 percent by weight of the uranium-235 content, and the total fissile content does not exceed 1 percent by weight of the total uranium content;

(4) Homogenous hydrogenous solutions or mixtures containing not more than:

(i) 500 grams of any fissile material, provided the atomic ratio of hydrogen to fissile material is greater than 7,600; or

(ii) 800 grams of uranium-235, if the atomic ratio of hydrogen to fissile material is greater than 5,200, and the content of other fissile material is not more than 1 percent by weight of the total uranium-235 content; or

(iii) 500 grams of uranium-233 and uranium-235, if the atomic ratio of hydrogen to fissile material is greater

than 5,200 and the content of plutonium is not more than 1 percent by weight of the total uranium-233 and uranium-235 content.

(5) A package containing less than 350 grams of fissile material, if there is not more than 5 grams of fissile material in any cubic foot within the package.

(b) Fissile radioactive materials containing not more than Type A quantities of radionuclides, in either normal form or special form, must be packaged in the packagings listed in § 146.19–100, subject to these conditions:

(1) Metal packaging DOT Specification 6L is authorized only for enriched uranium, the fissile content not to exceed 14 kilograms of uranium-235 as metal or oxide, or as compounds or alloys which will not decompose at temperatures up to 750° F. Each package shipped as Fissile Class II shall be assigned a transport index of 1.3 (unless external radiation levels require a higher assignment). The atomic ratio of hydrogen to uranium-235 shall not exceed three, all sources of hydrogen within the Specification 2R inner containment vessel being considered. The gross weight of the loaded package shall not exceed 350 pounds for the 55-gallon size or 480 pounds for sizes up through 110 gallons.

(2) Metal packaging DOT Specification 6M is authorized only for contents named in paragraph (c)(2) of this section.

(3) Other packagings are authorized in § 146.19–100 only for not more than the following:

(i) 500 grams of uranium-235 as Fissile Class III, or not more than 40 grams of uranium-235 as Fissile Class II. For Fissile Class II shipments, the transport index to be assigned to each package shall be 0.4 for each gram of uranium-235 above 15 grams up to a maximum of 40 grams (transport index of 10).

(ii) 320 grams of plutonium-239 as plutonium-beryllium neutron sources in special form. Total radioactivity content must not exceed 20 curies. The transport index shall be 0.5 for each 20 grams, or fraction thereof, of fissile plutonium.

(c) Fissile radioactive materials containing Type B quantities of radionuclides in either normal form or special form, must be packaged as follows:

(1) *DOT Specification 6L metal packaging.* Authorized only for enriched uranium, the fissile content not to exceed 14 kilograms uranium-235 as metal or oxide, or as compounds or alloys which will not decompose at temperatures up to 750° F. Each package shipped as Fissile Class II shall be assigned a transport index of 1.3 (unless external radiation levels require a higher assignment). The atomic ratio of hydrogen to uranium-235 shall not exceed three, all sources of hydrogen within the Specification 2R inner containment vessel being considered. The gross weight of the loaded package shall not exceed 350 pounds for the 55-gallon size or 480 pounds for sizes up through 110 gallons.

(2) *DOT Specification 6M metal packaging.* Authorized only for solid radioactive materials which will not decompose at temperatures up to 250° F. Radioactive thermal decay energy output shall not exceed 10 watts. Large quantity radioactive materials in normal form must be packaged in one or more sealed and leak-tight metal cans or polyethylene bottles within the Specification 2R containment vessel.

(i) *Fissile Class I packages.* The following quantities of fissile radioactive material are authorized for Fissile Class I packages: 1.6 kilograms uranium-235; 0.9 kilograms of plutonium (see note); 0.5 kilograms of uranium-233. The maximum ratio of hydrogen to fissile material must not exceed three, all sources of hydrogen within the Specification 2R containment vessel being considered.

NOTE: Because of the 10-watt thermal decay heat limitation, the limit for plutonium-238 is only 0.02 kilograms.

(ii) *Fissile Class II and III packages.* Quantities of fissile radioactive material as shown in the following table are authorized for Fissile Class II and Fissile Class III packages. Where a maximum ratio of hydrogen to fissile material is specified in the table, only the hydrogen interspersed with the fissile material need be considered. For Fissile Class II packages, the minimum transport index to be assigned is shown in the table. For Fissile Class III packages, the maximum number of similar packages per transport vehicle is shown. Fissile Class III shipments are also subject to paragraph (g) of this section.

TABLE OF AUTHORIZED CONTENTS [1]

Uranium-235 [2]			Plutonium [3] [4]			Fissile Class II transport index	Fissile Class III, maximum number packages per transport vehicle
Metal or alloy H/X=0	Compounds H/X=0	Compounds H/X≤3	Metal or alloy H/X=0	Compounds H/X=0	Compounds H/X≤3		
7.2	7.6	5.2	3.1	4.1	3.4	0.1	1,250
8.7	9.6	6.4	3.4	4.5	4.1	0.2	625
11.2	13.9	8.3	4.2	----------	4.5	0.5	250
13.5	16.0	10.1	4.5	----------	----------	1.0	125
----------	26.0	16.1	----------	----------	----------	5.0	25
----------	32.0	19.5	----------	----------	----------	10.0	12

[1] Quantity in kilograms.
[2] Maximum uranium-235 enrichment is 93 weight percent.
[3] Minimum percentage of plutonium-240 is 5 weight percent.
[4] 4.5 kilogram limitation on plutonium due to 10-watt decay heat limitation.

(d) Petitions for authorization of nonspecification packagings for fissile radioactive materials must be submitted as prescribed in § 146.02–25, and must also include the following:

(1) Type and amount of fissile radioactive materials which are to be carried in each package, including:

(i) The transport index to be assigned to the package for the proposed package loading when shipped as Fissile Class II; and

(ii) The maximum number of packages proposed when shipped as Fissile Class III.

(2) A nuclear criticality safety evaluation demonstrating that the packaging design and limitation on its contents are adequate to ensure nuclear criticality safety. Any test performed in this respect should be described.

NOTE: In applying for authorization of packages for fissile radioactive materials to be used in shipments by the U.S. Atomic Energy Commission, or one of its contractors or licensees, a copy of the license amendment or other approval issued by that Commission will be accepted in place of the nuclear criticality safety evaluation and the package structural integrity evaluation.

(e) Mixing of packages of other types of radioactive materials, including Fissile Class I, with Fissile Class II packages is permitted if the total transport index in any one stowage location does not exceed 50.

(f) For Fissile Class II packages shipped under the exclusive use provisions of § 146.19–10(j) to provide for packages with high radiation dose rates, the transport index number which is calculated for nuclear criticality control purposes must not exceed 10 for any single package or a total of 50 for the full load, unless specifically authorized by the Commandant for Fissile Class III shipments.

(g) Fissile Class III shipments may be made only in accordance with procedures authorized by the Commandant. Such transport controls must provide nuclear criticality safety and shall be carried out by the shipper or carrier, as appropriate, to protect against loading, transporting, or stowing of that shipment together with other fissile material.

§ 146.19–14 Small quantities of radioactive materials and radioactive devices.

(a) Radioactive materials in normal form not exceeding 0.01 millicurie of Group I radionuclides; 0.1 millicurie of Group II radionuclides; 1 millicurie of Groups III, IV, V, or VI radionuclides; 25 curies of Group VII radionuclides; tritium oxide in aqueous solution with a concentration not exceeding 0.5 millicuries per milliliter and with a total activity per package of not more than 3 curies; or 1 millicurie of radioactive material in special form; and not containing more than 15 grams of uranium-235 are exempt from specification packaging, marking, and labeling, and are exempt from the provisions of § 146.19–10 if the following conditions are met:

(1) The materials are packaged in strong tight packages such that there will be no leakage of radioactive materials under conditions normally incident to transportation.

(2) The package must be such that the radiation dose rate at any point on the

external surface of the package does not exceed 0.5 millirem per hour.

(3) There must be no significant removable radioactive surface contamination on the exterior of the package (see § 146.19–30).

(4) The outside of the inner container must bear the marking "Radioactive."

(b) Manufactured articles such as instruments, clocks, electronic tubes or apparatus, or other similar devices, having radioactive materials (other than liquids) in a nondispersible form as a component part, are exempt from specification packaging, marking, and labeling, and are exempt from the provisions of § 146.19–10, if the following conditions are met:

NOTE 1: For radioactive gases, the requirement for the radioactive material to be in a nondispersible form does not apply.

(1) Radioactive materials are securely contained within the devices, or are securely packaged in strong, tight packages, so that there will be no leakage of radioactive materials incident to transportation.

(2) The radiation dose rate at four inches from any unpackaged device does not exceed 10 millirem per hour.

(3) The radiation dose rate at any point on the external surface of the outside container does not exceed 0.5 millirem per hour. However, for carload or truckload lots only, the radiation at the external surface of the package or the item may exceed 0.5 millirem per hour, but must not exceed 2 millirem per hour.

(4) There must be no significant removable radioactive surface contamination on the exterior of the package (see § 146.19–30).

(5) The total radioactivity content of a package containing radioactive devices must not exceed the quantities shown in the following table:

Transport group	Quantity in curies	
	Per device	Per package
I	0.0001	0.001
II	0.001	0.05
III	0.01	3
IV	0.05	3
V or VI	1	1
VII	25	200
Special form	0.05	20

(6) No package may contain more than 15 grams of fissile material.

(c) Manufactured articles, other than reactor fuel elements, in which the sole radioactive material is natural or depleted uranium, are exempt from specification packaging, marking, and labeling and are exempt from the provisions of § 146.19–10, if the following conditions are met:

(1) The radiation dose rate at any point on the external surface of the outside container does not exceed 0.5 millirem per hour;

(2) There must be no detectable radioactive surface contamination on the exterior of the package (see § 146.19–30).

(3) The total radioactivity content of each article must not exceed 3 curies.

(4) The outer surface of the uranium is enclosed in an inactive metallic sheet.

NOTE: Such articles may be packagings for the transportation of radioactive materials.

§ 146.19–16 Low specific activity materials.

(a) Low specific activity materials when transported as other than a full load are exempt from the provisions of § 146.19–10 (a) through (g); however, they must be packaged and stowed in accordance with the requirements of § 146.19–100, and must be marked and labeled as required in §§ 146.05–15(b) and 146.19–25.

(b) Low specific activity materials which are transported as a full load are exempt from specification packaging, marking, and labeling provided the shipments meet the requirements of paragraph (c) or (d) of this section.

(c) Packaged shipments of low specific activity materials transported as a full load must comply with the following:

(1) Materials must be packaged in strong, tight packages such that there will be no leakage of radioactive material under conditions normally incident to transportation.

(2) Packages must not have any significant removable surface contamination (see § 146.19–30).

(3) External radiation levels must comply with § 146.19–10(j).

(4) There must be no loose radioactive material in the car, vehicle, van, portable container, or hold.

(5) Shipment must be braced so as to prevent leakage or shift of lading under conditions normally incident to transportation.

(6) The outside of each outside package must be stencilled or otherwise marked "Radioactive-LSA."

(d) Unpackaged (bulk) shipments of low specific activity materials transported as a full load must comply with the following:

(1) Authorized materials are limited to the following:

(i) Uranium or thorium ores and physical or chemical concentrates of those ores;

(ii) Uranium metal or natural thorium metal, or alloys of these materials; or

(iii) Materials of low radioactive concentration, if the average estimated radioactivity concentration does not exceed 0.001 millicurie per gram and the contribution from Group I material does not exceed 1 percent of the total radioactivity.

(iv) Objects of non-radioactive materials externally contaminated with radioactive material, provided that the radioactive material is not readily dispersible and the surface contamination, when averaged over 1 square meter, does not exceed 0.0001 millicurie per square centimeter of Group I radionuclides or 0.001 millicurie per square centimeter of other radionuclides. Such objects must be suitably wrapped or enclosed.

(2) External radiation levels must comply with subparagraphs (2) and (3) of § 146.19–10(j).

§ 146.19–18 Radioactive material in normal form.

(a) Radioactive materials in normal form in Type A and Type B quantities must be packaged in authorized packagings as listed in § 146.19–100.

(b) Large quantities of radioactive materials in normal form must be packaged in packaging authorized in § 146.19–100 or in Type B packaging which meets the standards prescribed in the regulations of the U.S. Atomic Energy Commission (10 CFR Part 71) or the 1967 regulations of the International Atomic Energy Agency, and which has been specifically authorized for such use by the Commandant under § 146.02–25. In applying for the Commandant's authorization of packages for large quantities of radioactive materials to be used in shipments by the U.S. Atomic Energy Commission or its contractors or licensees, a copy of the license amendment or other approval issued by that Commission will be accepted in place of the package structural integrity evaluation.

§ 146.19–20 Radioactive material in special form.

(a) Radioactive materials in special form in Type A and Type B quantities must be packaged in authorized packagings as listed in § 146.19–100.

(b) Large quantities of radioactive materials in special form must be packaged in packaging authorized in § 146.10–100 or in Type B packaging which meets the standards in the regulations of the U.S. Atomic Energy Commission (10 CFR Part 71), or the 1967 regulations of the International Atomic Energy Agency, and which has been specifically authorized for such use by the Commandant under § 146.02–25. In applying for the Commandant's authorization of packages for large quantities of radioactive materials to be used in shipments by the U.S. Atomic Energy Commission or its contractors or licensees, a copy of the license amendment or other approval issued by that Commission will be accepted in place of the package structural integrity evaluation.

§ 146.19–25 Labeling of packages of radioactive materials.

(a) Each package of radioactive materials, unless exempted by § 146.19–14 or § 146.19–16, shall be labeled as provided in this section (see § 146.05–17 for description of labels). The label to be used shall be determined by the transport index or other considerations as follows:

(1) *Radioactive white-I label.* Each package not exceeding 0.5 millirem per hour at any point on the external surface of the package, and which does not come within the provisions of subparagraph (2) or (3) of this paragraph. Not authorized for Fissile Class II packages.

(2) *Radioactive yellow-II label.* When the limit in subparagraph (1) of this paragraph is exceeded but the provisions of subparagraph (3) of this paragraph are not met; and—

(i) Each package not exceeding 10 millirem per hour at any point on the external surface of the package and not exceeding 0.5 millirem per hour at 3 feet from the external surace of the package; or

(ii) Each package for which the transport index does not exceed 0.5 at any time during transportation.

(3) *Radioactive yellow-III label.* When either of the limits in subparagraph (2) of this paragraph is exceeded. In addition, the following types of packages must also bear this label:

(i) Each Fissile Class III package;

(ii) Each package containing a large quantity of radioactive material as defined in §146.19–1; or

(iii) Each package being transported under a permit issued as authorized in § 146.02–25.

(b) Radioactive materials having other hazardous characteristics, as defined elsewhere in this part must also be labeled with other labels as required by this part according to the hazards of the commodity (see § 146.05–15). For example:

(1) Packages containing the solid nitrates of uranium or thorium must bear both a "radioactive" label and a "yellow" oxidizing materials label.

(2) Packages containing nitric acid solutions of radioactive materials must bear both a "radioactive" label and a "white" corrosive acid label.

§ 146.19–27 Special tests.

(a) Special form material: To qualify as special form material, the radioactive material must either have no overall dimension less than 0.5 millimeter, or must have at least one dimension greater than 5 millimeters. Each item, or the capsule material, must not dissolve or convert into dispersible form to the extent of more than 0.005 percent, by weight, by immersion for 1 week in water at pH 6–8 and 68° F., and a maximum conductivity of 10 micromhos/centimeter, and by immersion in air at 86° F. If in massive solid form, the radioactive material must not break, crumble, or shatter if subjected to the percussion test prescribed in this section, and must not melt, sublime, or ignite at temperatures below 1,000° F. If encapsulated, the capsule must retain its contents when subjected to all of the performance tests prescribed in this section, and must not melt, sublime, or ignite at temperatures below 1,475° F.

(1) *Free drop.* A free drop through a distance of 30 feet on to a flat essentially unyielding horizontal surface, striking the surface in such a position as to suffer maximum damage.

(2) *Percussion.* Impact of the flat circular end of a 1-inch-diameter steel rod weighing 3 pounds, dropped through a distance of 40 inches. The capsule or material shall be placed on a sheet of lead, of hardness number 3.5 to 4.5 on the Vickers scale, and not more than 1 inch thick, supported by a smooth, essentially unyielding surface.

(3) *Heating.* Heating in air to a temperature of 1,475° F. and remaining at that temperature for a period of 10 minutes.

(4) *Immersion.* Immersion for 24 hours in water at room temperature. The water shall be at pH6–pH8, with a maximum conductivity of 10 micromhos/cm.

(b) Standards for Type A packaging:

(1) Type A packaging must be so designed and constructed that, if it were subject to the environmental and test conditions prescribed in this paragraph:

(i) There would be no release of radioactive material from the package;

(ii) The effectiveness of the packaging would not be substantially reduced; and

(iii) There would be no mixture of gases or vapors in the package which could, through any credible increase of pressure or an explosion, significantly reduce the effectiveness of the package.

(2) Environmental conditions:

(i) *Heat.* Direct sunlight at an ambient temperature of 130° F., in still air.

(ii) *Cold.* An ambient temperature of −40° F. in still air and shade.

(iii) *Reduced pressure.* Ambient atmospheric pressure of 0.5 atmosphere (absolute) (7.3 p.s.i.a.).

(iv) *Vibration.* Vibration normally incident to transportation.

(3) Test conditions: The packaging shall be subject to all of the following tests unless specifically exempted therefrom, and also to the consecutive application of at least two of the following tests from which it is not specifically exempted:

(i) *Water spray.* A water spray heavy enough to keep the entire exposed surface of the package except the bottom continuously wet during a period of 30 minutes. Packages for which the outer layer consists entirely of metal, wood, ceramic, or plastic or combinations thereof, are exempt from the water spray test.

(ii) *Free drop.* Between 1½ to 2½ hours after the conclusion of the water spray test, a free drop through a distance of 4 feet onto a flat essentially unyielding horizontal surface, striking the surface in a position for which maximum damage is expected.

(iii) *Corner drop.* A free drop onto each corner of the package in succession, or in the case of a cylindrical package onto each quarter of each rim, from a height of 1 foot onto a flat essentially unyielding horizontal surface. This test applies only to packages which are constructed primarily of wood or fibreboard, and do not exceed 110 pounds gross weight, and to all Fissile Class II packagings.

(iv) *Penetration.* Impact of the hemispherical end of a vertical steel cylinder 1½ inches in diameter and weighing 13 pounds, dropped from a height of 40 inches onto the exposed surface of the package which is expected to be most vulnerable to puncture. The long axis of the cylinder shall be perpendicular to the package surface.

(v) *Compression.* For packages not more than 10,000 pounds in weight, a compressive load equal to either five times the weight of the package or 2 pounds per square inch multiplied by the maximum horizontal cross section of the package, whichever is greater. The load shall be applied during a period of 24 hours, uniformly against the top and bottom of the package in the position in which the package would normally be transported.

(c) Standards for hypothetical accident conditions of transportation for Type B packagings:

(1) Type B packaging must meet the applicable Type A packaging standards and must be designed and constructed and its contents so limited that, if subjected to the hypothetical accident conditions prescribed in this paragraph, it will meet the following conditions:

(i) The reduction of shielding would not be enough to increase the radiation dose rate at 3 feet from the external surface of the package to more than 1,000 millirem per hour.

(ii) No radioactive material would be released from packages containing Type B quantities of radioactive material. The allowable release of radioactivity from packages containing large quantities of radioactive material is limited to gases and contaminated coolant containing total radioactivity exceeding neither 0.1 percent of the total radioactivity of the package contents nor 0.01 curie of Group 1 radionuclides, 0.5 curies of Group II radionuclides, and 10 curies of Groups III and IV radionuclides, except that for inert gases the limit is 1,000 curies.

(2) Test conditions: The conditions which the package must be capable of withstanding must be applied sequentially, to determine their cumulative effect on a package, in the following order:

(i) *Free drop.* A free drop through a distance of 30 feet onto a flat essentially unyielding horizontal target surface, striking the surface in a position for which maximum damage is expected.

(ii) *Puncture.* A free drop through a distance of 40 inches striking, in a position for which maximum damage is expected, the top end of a vertical cylindrical mild-steel bar mounted on an essentially unyielding horizontal surface, the bar shall be 6 inches in diameter, with the top horizontal and its edge rounded to a radius of not more than one-fourth inch, and of such a length as to cause maximum damage to the package, but not less than 8 inches long. The long axis of the bar shall be perpendicular to the unyielding horizontal surface.

(iii) *Thermal.* Exposure to a thermal test in which the heat input to the package is no less than that which would result from exposure of the whole package to a radiation environment of 1,475° F. for 30 minutes with an emissivity coefficient of 0.9, assuming the surfaces of the package have an absorption coefficient of 0.8. The package shall not be cooled artificially until 3 hours after the test period unless it can be shown that the temperature on the inside of the package has begun to fall in less than 3 hours.

(iv) *Water immersion (fissile radioactive materials packages only).* Immersion in water to the extent that all portions of the package to be tested are under at least 3 feet of water for a period of not less than 8 hours.

(d) It is not necessary to actually conduct the tests prescribed in this section if it can be clearly shown, through engineering evaluations or comparative data, that the material or item would be capable of performing satisfactorily under the prescribed test conditions.

§ 146.19–30 Contamination control.

(a) Removable radioactive contamination shall not be considered as significant if the average amount of radioactive contamination which can be removed by wiping the external surface of the package with an absorbent material, as measured on the wiping material, does not exceed:

(1) 10^{-11} curie per square centimeter beta-gamma (2,200) disintegration/min. per 100 square centimeters) and 10^{-12} curie per square centimeter alpha (220 distintegrations/min. per 100 square centimeters) for all contaminants except natural or depleted uranium and natural thorium, or

(2) 10^{-10} curie per square centimeter beta-gamma (22,000 disintegrations/min. per 100 square centimeters) and 10^{-11} curie per square centimeter alpha (2200 disintegrations/min. per 100 square centimeters) where the only contaminant is known to be natural or depleted uranium or natural thorium.

(b) Each hold, compartment, or deck area used for the transportation of low specific activity radioactive materials as a full load under the provisions of this subpart must be surveyed with appropriate radiation detection instruments after each use. Such holds, compartments, or decks must not again be placed in service until the radiation dose rate at any accessible surface is not more than 0.5 millirem per hour, and there is no significant removable radioactive surface contamination.

§ 146.19–35 Stowage and handling aboard vessels.

(a) Packages or containers bearing the Radioactive white or Radioactive yellow labels shall be kept separated from living accommodations and from spaces that may be continually occupied by persons, except those exclusively reserved for couriers specially authorized to accompany such shipments. Packages bearing the Radioactive yellow label shall be separated from persons and undeveloped photographic and radiographic films in accordance with Table 146.10–35. (Mail bags shall be assumed to contain undeveloped film and separated from radioactive materials as for film.) The sum of the transport indexes for the shipment is the arithmetic total of the transport indexes of each package as stated on the label.

(b) The number of packages bearing the Radioactive-Yellow label shall be so limited that the sum of the transport indexes does not exceed 200 in any one ship unless authorized by the Commandant. In addition to complying with the segregation distance in paragraph (a) of this section, no single group of packages shall have a total Transport Index of more than 50 and each such group shall be handled and stowed not closer to any other group than 20 feet. The requirements of this paragraph do not apply to low specific activity materials as defined in § 146.19–1 in a compact stack nor need they apply in case of a full load where the consignor has the exclusive use of the whole vessel, providing that the transport indexes of Fissile Class II packages aboard the vessel do not exceed 50.

(c) Packages of radioactive materials which are significant heat sources shall not be overstowed with any other cargo. If stowed below decks the hold or compartment in which stowed must be ventilated.

(d) For radioactive materials shipments requiring supplementary operational procedures, the package shall be stowed in an accessible location and the necessary operational instructions furnished to the vessel's master.

(e) Fissile Class III shipments shall be separated by at least 20 feet from other packages bearing Radioactive-Yellow labels during handling and stowage.

(f) All containers of radioactive materials shall be carried by the handles when handles are provided:

(g) When "On deck in open" stowage is permitted for any substances by § 146.19–100, it shall apply only to the substances when packaged in authorized, waterproof packagings.

(h) No person shall remain unecessarily in a hold or compartment or in the immediate vicinity of a deck cargo space containing radioactive materials. The shipper shall furnish the carrier with such information and equipment as is necessary for the protection of the carrier's employees, stevedores, or other persons engaged in the handling of such cargo. In no instance shall any person who must necessarily remain in a hold, compartment, or deck cargo space containing radioactive material be exposed to a total of more than 100 millirem in any 7-day period: *Provided further*, That a maximum whole body dose of 500 millirem per year is not exceeded. The radiation level in any space or area on board continuously occupied by passengers, crew, or shipments of animals shall not exceed 0.5 millirem per hour at any time during transportation.

TABLE 146.19-35—SAFE DISTANCE FOR PERSONS AND UNDEVELOPED FILMS

Sum of transport indexes of the packages	Minimum distance in feet from living accommodation or regularly occupied working space	Minimum distance [1] in feet from undeveloped films or plates											
		Less than 24-hour voyage	24 up to 48-hour voyage	Over 2 up to 4-day voyage				Over 4 up to 9-day voyage					
	A	A	A	A	B	C	D	A	B	C	D		
0 through 0.5	10	3	5	10	10	10	10	15	10	10	10		
Over 0.5 through 1.0	10	5	7	15	10	10	10	20	10	10	10		
Over 1.0 through 2.0	15	7	12	20	10	10	10	25	15	10	10		
Over 2.0 through 5.0	25	10	16	30	10	10	10	40	15	10	10		
Over 5.0 through 10.0	35	15	16	40	15	10	10	55	20	10	10		
Over 10.0 through 25.0	60	20	10	25	65	35	10	10	100	50	10	10	
Over 25.0 through 50.0	90	30	10	10	85	50	90	50	10	10	145	45	10	10
Over 50.0 through 100	135	40	10	10	50	70	140	45	10	10	210	65	10	10
Over 100 through 200	195	55	10	10	70	100	150	85	10	10	295	85	15	10
Over 200 through 300 [2]	235	70	10	10	90	125	230	70	10	10	320	105	15	10
Over 300 through 400 [2]	265	80	15	10	100	145	260	80	15	10	360	120	20	10

Sum of transport indexes of the packages	Minimum distance [1] in feet from undeveloped films or plates—Con.													
	Over 9 up to 16-day voyage				Over 16 up to 25-day voyage				Over 25 up to 36-day voyage				Over 36 up to 49-day voyage			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
0 through 0.5	20	10	10	10	20	10	10	10	25	15	10	10	30	15	10	10
Over 0.5 through 1.0	25	15	10	10	30	15	10	10	35	20	10	10	45	20	10	10
Over 1.0 through 2.0	35	15	10	10	45	20	10	10	50	25	10	10	65	30	10	10
Over 2.0 through 5.0	60	20	10	10	70	25	10	10	90	30	10	10	100	35	10	10
Over 5.0 through 10.0	85	30	10	10	110	35	10	10	135	40	10	10	155	45	10	10
Over 10.0 through 25.0	140	45	10	10	170	50	10	10	200	60	10	10	230	70	10	10
Over 25.0 through 50.0	195	60	10	10	240	70	10	10	275	85	15	10	315	105	15	10
Over 50.0 through 100	270	85	15	10	320	95	15	10	385	115	20	10	400	145	20	10
Over 100 through 200	325	110	20	10	400	145	20	10	450	190	25	10	500	170	30	10
Over 200 through 300 [2]	400	145	25	10	460	175	25	10	500	220	30	10	([3])	240	35	10
Over 300 through 400 [2]	450	165	30	10	500	200	30	10	([3])	235	35	10	([3])	270	40	10

[1] Column A applies when no intervening cargo or bulkheads screen the radioactive material from the living accommodation or undeveloped photographic film or plate. Column B applies when the radioactive material is to be surrounded by at least 2 feet of cargo of unit density and at least 1 steel bulkhead between the radioactive material and the living accommodation or undeveloped photographic film or plate.

Column C applies when the radioactive material is to be surrounded by at least 6 feet of cargo of unit density and at least 2 steel bulkheads between the radioactive material and the living accommodation or undeveloped photographic film or plate.

Column D applies when the radioactive material is to be surrounded by at least 14 feet of cargo of unit density and at least 2 steel bulkheads between the radioactive material and the living accommodation or undeveloped photographic film or plate.

"Cargo of unit density" means cargo stowed at a density of 1 ton per 36 cubic feet (1 ton metric per cubic meter). Where the density of the cargo is less than this, the depth of the cargo specified in this note for columns B, C, and D (i.e., 2 feet, 6 feet, and 14 feet) must be increased in proportion.

"Minimum distance" means the least distance in any direction, whether vertical or horizontal.

[2] The total consignment on board at any time must not exceed transport indexes totaling 200 without prior authorization by the Commandant (see § 146.19–35(b)).

[3] Not to be carried unless screening by other cargo and bulkheads can be arranged in accordance with columns B, C, or D.

§ 146.19–40 Segregation from other cargoes.

(a) Radioactive materials shall not be stowed in the same hold or compartment with Class A, Class B, or Class C explosives, flammable gases, flammable liquids, oxidizing materials, flammable solids, corrosive liquids, or cotton.

(b) Radioactive materials shall be stowed away from (i.e., with intervening cargo or ship's structure) nonflammable gases and foodstuffs.

(c) Radioactive materials shall be separated from mail and undeveloped films in accordance with § 146.19–35(a).

§ 146.19–50 Care following leakage or sifting of radioactive materials.

(a) In case of fire, collision, or breakage involving shipments of radioactive materials, other than the materials of low specific activity, the package or material shall be segregated from unnecessary contact with personnel. In case of obvious leakage, or if the inside container appears to have been damaged, the section (hold, deck area, or compartment) containing this cargo must be isolated as much as possible, and care should be taken to prevent radioactive material from entering the body through contact, inhalation, or ingestion. No person shall be allowed to handle the material or to remain in the vicinity until qualified personnel are present to supervise. In any incident in which radioactive materials are involved in fires or are damaged, the shipper and the District Commander of the U.S. Coast Guard, or his authorized representative, having supervision over the port or place where the vessel is located or bound, shall be notified immediately.

(b) Holds and compartments used for the transport of low activity materials as full loads or in which leakage of radioactive materials has occurred because of fire, collision or breakage, shall not be used for other goods until decontaminated as specified in § 146.19–30.

§ 146.19–70 Use of power-operated industrial trucks in spaces containing radioactive materials.

(a) Any approved power-operated industrial truck (see § 146.09–15) may be used in spaces in which radioactive materials are stowed, including the handling thereof, unless otherwise restricted by regulations in this part.

§ 146.19–80 Vessels utilizing nuclear energy or handling radioactive materials.

(a) All vessels utilizing nuclear energy for propulsion or for any other purpose, or handling radioactive materials other than as cargo shall comply with the applicable requirements in Part 55 of Subchapter F (Marine Engineering), and Part 37 of Subchapter D (Tank Vessels), or Part 79 of Subchapter H (Passenger Vessels), or Part 99 of Subchapter I (Cargo and Miscellaneous Vessels) of this chapter. The regulations covering the transportation and handling of radioactive materials as cargo are set forth in this subpart.

§ 146.19–100 Table—Classification: Radioactive materials.

Descriptive name of article	Characteristic properties, cautions, markings required	Label required	Required conditions for transportation			
			Cargo vessel	Passenger vessel	Ferry vessel, passenger or vehicle	RR. car ferry, passenger or vehicle
Fissile radioactive materials.	*Fissile radioactive material has the additional property that it affords a possibility of a self-sustaining nuclear fission reaction including* Pu^{238}, Pu^{239}, Pu^{241}, U^{233}, *and* U^{235}, *as described in §§146.19–1 and 146.19–12. Exempt materials are listed in §146.19–12(a).* Do not stow with explosives, flammable gases, flammable liquids, flammable solids, oxidizing materials, corrosive liquids, cotton, foodstuffs, or mail. Do not stow near undeveloped photographic or radiographic films. (See § 146.19–35.)	Radioactive	Stowage: "On deck protected." "On deck under cover." "Tween decks readily accessible." Outside packaging: Authorized for Type A quantities in normal form or special form (See Note 1): Metal packaging (DOT–6L, 6M). Metal drums (DOT–5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT–21C). Wooden boxes (DOT–14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT–12 series) 200-lb. test minimum. Cylinders (DOT–3, 4 series). Metal-encased shielded packaging (DOT–55). Type A general package (DOT–7A). Foreign-made packagings bearing the symbol "Type A," for export and import shipments only. Authorized for Type B quantities in normal form or special form (see Note 2): Metal packaging (DOT–6L, 6M).	Stowage: "On deck protected." "On deck under cover." "Tween decks readily accessible." Outside packaging: Authorized for Type A quantities in normal form or special form (See Note 1): Metal packaging (DOT–6L, 6M). Metal drums (DOT–5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT–21C). Wooden boxes (DOT–14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT–12 series) 200-lb. test minimum. Cylinders (DOT–3, 4 series). Metal-encased shielded packaging (DOT–55). Type A general package (DOT–7A). Foreign-made packagings bearing the symbol "Type A," for export and import shipments only. Authorized for Type B quantities in normal form or special form (see Note 2): Metal packaging (DOT–6L, 6M).	Ferry stowage (AA). Outside packagings: Authorized for Type A quantities in normal form or special form (See Note 1): Metal packaging (DOT–6L, 6M). Metal drums (DOT–5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT–21C). Wooden boxes (DOT–14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT–12 series) 200-lb. test minimum. Cylinders (DOT–3, 4 series). Metal-encased shielded packaging (DOT–55). Type A general package (DOT–7A). Foreign-made packagings bearing the symbol "Type A," for export and import shipments only. Authorized for Type B quantities in normal form or special form (see Note 2): Metal packaging (DOT–6L, 6M).	Ferry stowage (BB). Outside packagings: Authorized for Type A quantities in normal form or special form (See Note 1): Metal packaging (DOT–6L, 6M). Metal drums (DOT–5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT–21C). Wooden boxes (DOT–14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT–12 series) 200-lb. test minimum. Cylinders (DOT–3, 4 series). Metal-encased shielded packaging (DOT–55). Type A general package (DOT–7A). Foreign-made packagings bearing the symbol "Type A," for export and import shipments only. Authorized for Type B quantities in normal form or special form (see Note 2): Metal packaging (DOT–6L, 6M).
Radioactive devices. Radioactive materials, small quantities.	*Radioactive devices are manufactured articles such as instruments, clocks, electronic tubes or apparatus, or other similar devices having radioactive materials as a component part, meeting the requirements of § 146.19–14(b).* *Small quantities are radioactive materials as limited by, and meeting the conditions of, § 146.19–14(a).* Do not stow with explosives, flammable gases, flammable liquids, flammable solids, oxidizing materials, corrosive liquids, cotton, foodstuffs, or mail. Do not stow near undeveloped photographic or radiographic films. (See § 146.19–35.) The outside of the inner package or item must bear the marking "Radioactive."	No label required.	Stowage: "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packagings: Strong, tight packages meeting the conditions of § 146.19–14.	Stowage: "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packagings: Strong, tight packages meeting the conditions of § 146.19–14.	Ferry stowage (AA). Outside packagings: Strong, tight packages meeting the conditions of § 146.19–14.	Ferry stowage (BB). Outside packagings: Strong, tight packages meeting the conditions of § 146.19–14.

Note 1: See § 146.19–12(b) for limitations on contents.
Note 2: See § 146.19–12(c) for limitation on contents.

Descriptive name of article	Characteristic properties, cautions, markings required	Label required	Required conditions for transportation			
			Cargo vessel	Passenger vessel	Ferry vessel, passenger or vehicle	RR. car ferry, passenger or vehicle
Radioactive material, low specific activity (LSA).	*Uranium or thorium ores and physical or chemical concentrates of those ores; unirradiated natural or depleted uranium or unirradiated natural thorium; tritium oxide in aqueous solutions (including "heavy water") not exceeding 5.0 mc/ml concentration; and other materials containing dilute radionuclides as described in §§ 146.19-1 and 146.19-16(a).* Do not stow with explosives, flammable gases, flammable liquids, flammable solids, oxidizing materials, corrosive liquids, cotton, foodstuffs, or mail. Do not stow near undeveloped photographic or radiographic films. (See § 146.19-35.) The outside of each package must bear the marking "Radioactive-LSA."	Radioactive.	Stowage: "On deck in open." "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packagings: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series) 200-lb. test minimum. Cylinders (DOT-3 series, DOT-4 series).	Stowage: "On deck in open." "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packagings: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series) 200-lb. test minimum. Cylinders (DOT-3 series, DOT-4 series).	Ferry stowage (AA). Outside packagings: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series) 200-lb. test minimum. Cylinders (DOT-3 series, DOT-4 series).	Ferry stowage (BB). Outside packagings: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series) 200-lb. test minimum. Cylinders (DOT-3 series, DOT-4 series).
Radioactive materials, low specific activity (LSA) *consigned as "Full Load."*	Shipments of low specific activity radioactive materials in packages and consigned as a "full load" must meet the requirements of §146.19-16(c). "Full load" is defined in §146.19-1. Do not stow with explosives, flammable gases, flammable liquids, flammable solids, oxidizing materials, corrosive liquids, cotton, foodstuffs, or mail. Do not stow near undeveloped photographic or radiographic films. (See §146.19-35.) The outside of each outer package must bear the marking "Radioactive-LSA."	No label required on individual packages.	Stowage: "On deck in open." "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packaging: Strong, tight packaging.	Stowage: "On deck in open." "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packaging: Strong, tight packaging.	Ferry stowage (AA). Outside packaging: Strong, tight packaging.	Ferry stowage (BB). Outside packaging: Strong, tight packaging.
Radioactive materials, low specific activity (LSA). *Bulk or unpackaged shipments consigned as "Full Load."*	Shipments of bulk or unpackaged low specific activity radioactive materials consigned as a "full load" must meet the requirements of §146.19-16(d).	No label required.	Stowage: "On deck under cover." "Tween decks." "Under deck." Outside packaging: Tight, sift-proof transport vehicles and vans. Bulk. Authorized for liquids only: Motor vehicle tank trucks complying with DOT regulations (trailerships and trainships only). Tank cars complying with DOT regulations (trainships only).	Stowage: "On deck under cover." "Tween decks." "Under deck." Outside packaging: Tight, sift-proof transport vehicles and vans.	Ferry stowage (AA). Outside packaging: Tight, sift-proof transport vehicles and vans. Authorized for liquids only: Motor vehicle tank trucks complying with DOT regulations.	Ferry stowage (BB). Outside packaging: Tight, sift-proof transport vehicles and vans. Authorized for liquids only: Motor vehicle tank trucks complying with DOT regulations.

Descriptive name of article	Characteristic properties, cautions, markings required	Label required	Required conditions for transportation			
			Cargo vessel	Passenger vessel	Ferry vessel, passenger or vehicle	RR. car ferry, passenger or vehicle
Radioactive materials, N.O.S.	*Radioactive materials in normal form (i.e., not in special form—see § 146.19-1) and not otherwise listed by name or exempted by §§ 146.19-12 through 146.19-16.* Do not stow with explosives, flammable gases, flammable liquids, flammable solids, oxidizing materials, corrosive liquids, cotton, foodstuffs, or mail. Do not stow near undeveloped photographic or radiographic films. (See § 146.19-35.)	Radioactive	Stowage: "On deck protected." "On deck under cover." "Tween deck." "Under deck." Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L. 6M, 17C, 17H, 42B, 42C, Fiber drums (DOT-21). Wooden boxes (DOT 14, 15A, 15B, 15C, 15D, 19A, 19B). Fiber board boxess (DOT-12 series (200-lb. test minimum. Cylinders(DOT-3 series, DOT- 4serie). Metal-encased, shieded packagIng (DOT-55). Type A general package (DOT-7A Foreign-made packgaings bearing, the symbol "Type A", export and import shipments only Authorized for Type B quantities; Metal packaging (DOT-6M), authorized only for solod or gaseou rsp radioactive materials which will noi decompose at temperatures up to 250° F For large quantities, see § 146.19-18.	Stowage: "On deck protected." "On deck under cover." "Tween deck." "Under deck." Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21C). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series) 200-lb. test minimum. Cylinders (DOT-3 series, DOT-4 series). Metal-encased, shielded packaging (DOT-55). Type A general package (DOT-7A). Foreign-made packagings bearing the symbol "Type A", export and import shipments only. Authorized for Type B quantities: Metal packaging (DOT-6M), authorized only for solid or gaseous radioactive materials which will not decompose at temperatures up to 250° F. For large quantities, see §146.19-18.	Ferry stowage (AA) Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5B, 5D, 5A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21C). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series) 200-lb. test minimum. Cylinders (DOT-3 series, DOT-4 series). Metal-encased, shielded packaging (DOT-55). Type A general package (DOT-7A). Foreign-made packagings bearing the symbol "Type A", export and import shipments only. Authorized for Type B quantities: Metal packaging (DOT-6M), authorized only for solid or gaseous radioactive materials which will not decompose at temperatures up to 250° F. For large quantities, see § 146.19-18.	Ferry stowage (BB). Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21C). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series) 200-lb. test minimum. Cylinders (DOT-3 series, DOT-4 series). Metal-encased, shielded packaging (DOT-55). Type A general package (DOT-7A). Foreign-made packagings bearing the symbol "Type A", export and import shipments, only. Authorized for Type B quantities: Metal packaging (DOT-6M), authorized only for solid or gaseous radioactive materials which will not decompose at temperatures up to 250° F. For large quantities, see § 146.19-18.
Radioactive materials, special form.	*Radioactive materials which by inherent properties or acquired characteristics would, if released from a package, present some direct radiation hazard but would present little hazard due to radiotoxicity and little possibility of contamination (see §§146.19-1(h) and 146.19-27(a)).* Do not stow with explosives, flammable gases, flammable liquids, flammable solids, oxidizing materials, corrosive liquids, cotton, foodstuffs, or mail. Do not stow near undeveloped photographic or radiographic films. (See § 146.19-35.)	Radioactive	Stowage: "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21C). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series, 200-lb. test minimum, DOT-23F, 23H). Metal-encased shielded packaging (DOT-55). Type A general package (DOT-7A). Foreign-made packagings bearing the symbol "Type A", for export and import shipments only. Authorized for Type B quantities: Metal-encased shielded packaging (DOT-55), authorized for not more than 300 curies, for domestic shipments only Metal packaging (DOT-6M). Authorized for large quantities: Metal packaging (DOT-6M); radioactive decay thermal energy must not exceed 10 watts.	Stowage: "On deck protected." "On deck under cover." "Tween decks." "Under deck." Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21C). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series, 200-lb. test minimum, DOT-23F, 23H). Metal-encased shielded packaging (DOT-55). Type A general package (DOT-7A). Foreign-made packagings bearing the symbol "Type A", for export and import shipments only. Authorized for Type B quantities: Metal-encased shielded packaging (DOT-55), authorized for not more than 300 curies, for domestic shipments only. Metal packaging (DOT-6M). Authorized for large quantities: Metal packaging (DOT-6M); radioactive decay thermal energy must not exceed 10 watts.	Ferry stowage (AA) Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5B, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21C). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series, 200-lb. test minimum, DOT-23F, 23H). Metal-encased shielded packaging (DOT-55). Type A general package (DOT-7A). Foreign-made packagings bearing the symbol "Type A", for export and import shipments only. Authorized for Type B quantities: Metal-encased shielded packaging (DOT-55), authorized for not more than 300 curies, for domestic shipments only. Metal packaging (DOT-6M). Authorized for large quantities: Metal packaging (DOT-6M); radioactive decay thermal energy must not exceed 10 watts.	Ferry stowage (BB). Outside packaging: Authorized for Type A quantities: Metal drums (DOT-5b, 5D, 6A, 6B, 6C, 6J, 6K, 6L, 6M, 17C, 17H, 42B, 42C). Fiber drums (DOT-21C). Wooden boxes (DOT-14, 15A, 15B, 15C, 15D, 19A, 19B). Fiberboard boxes (DOT-12 series, 200-lb. test minimum, DOT-23F, 23H). Metal-encased shielded packaging (DOT-55). Type A general package (DOT-7A). Foreign-made packagings bearing the symbol "Type A", for export and import shipments only. Authorized for Type B quantities: Metal-encased shielded packaging (DOT-55), authorized for not more than 300 curies, for domestic shipments only. Metal packaging (DOT-6M). Authorized for large quantities: Metal packaging (DOT-6M); radioactive decay thermal energy must not exceed 10 watts.

Descriptive name of article	Characteristic properties, cautions, markings required	Label required	Required conditions for transportation			
			Cargo vessel	Passenger vessel	Ferry vessel, passenger or vehicle	RR. car ferry, passenger or vehicle
Thorium nitrate, solid... Uranyl nitrate, solid.....	*Radioactive materials which also have the hazardous characteristics of oxidizing materials.*	Radioactive plus yellow.	Stowage: "On deck in open." "On deck protected." "On deck under cover." "Tween decks." "Under deck."	Stowage: "On deck in open." "On deck protected." "On deck under cover." "Tween decks." "Under deck."	Ferry stowage (AA).....	Ferry stowage (BB).
	Do not stow with explosives, flammable gases, flammable liquids, combustible materials, corrosive liquids, or foodstuffs. Do not stow near undeveloped photographic or radiographic films. (See § 146.19–35.)		Outside packaging: Any packaging authorized by this table for solid radioactive materials, low specific activity, or fissile radioactive material, as appropriate. (Low specific activity material and fissile radioactive material are defined in § 146.19–1.)	Outside packaging: Any packaging authorized by this table for solid radioactive materials, low specific activity, or fissile radioactive material, as appropriate. (Low specific activity material and fissile radioactive material are defined in § 146.19–1.)	Outside packaging: Any packaging authorized by this table for solid radioactive materials, low specific activity, or fissile radioactive material, as appropriate. (Low specific activity material and fissile radioactive material are defined in § 146.19–1.)	Outside packaging: Any packaging authorized by this table for solid radioactive materials, low specific activity, or fissile radioactive material, as appropriate. (Low specific activity material and fissile radioactive material are defined in § 146.19–1.)

Subpart 146.20—Detailed Regulations Governing Explosives

30. Section 146.20–23 is amended by revising paragraphs (m) and (n) to read as follows:

§ 146.20–23 Stowage of explosives with other dangerous articles.

The stowage of explosives with other dangerous articles shall conform to the following conditions:

* * * * *

(m) Class A or Class B explosives shall not be stowed in the same hold or compartment with poisonous articles or with radioactive materials.

(n) Class C explosives shall not be stowed in the same hold or compartment with radioactive materials.

* * * * *

Subpart 146.21—Detailed Regulations Governing Inflammable Liquids

31. Section 146.21–30 is amended by adding a new paragraph (k) to read as follows:

§ 146.21–30 Stowage of inflammable liquids with explosives and other dangerous articles.

The stowage of inflammable liquids with explosives and other dangerous articles shall conform to the following conditions:

* * * * *

(k) Flammable liquids shall not be stowed in the same hold or compartment with radioactive materials.

Subpart 146.22—Detailed Regulations Governing Inflammable Solids and Oxidizing Materials

32. Section 146.22–10 is amended by adding a new paragraph (h) to read as follows:

§ 146.22–10 Stowage of inflammable solids with explosives and other dangerous articles.

The stowage of inflammable solids with explosives and other dangerous articles shall conform to the following conditions:

* * * * *

(h) Flammable solids shall not be stowed in the same hold or compartment with radioactive materials.

33. Section 146.22–15 is amended by adding a new paragraph (k) to read as follows:

§ 146.22–15 Stowage of oxidizing materials with explosives and other dangerous articles.

The stowage of oxidizing materials with explosives and other dangerous articles shall conform to the following conditions:

* * * * *

(k) Oxidizing materials shall not be stowed in the same hold or compartment with radioactive materials.

Subpart 146.23—Detailed Regulations Governing Corrosive Liquids

34. Section 146.23–25 is amended by adding a new paragraph (j) to read as follows:

§ 146.23–25 Stowage of corrosive liquids with explosives and other dangerous articles.

The stowage of corrosive liquids with explosives and other dangerous articles shall conform to the following conditions:

* * * * *

(j) Corrosive liquids shall not be stowed in the same hold or compartment with radioactive materials.

Subpart 146.24—Detailed Regulations Governing Compressed Gases

35. Section 146.24–55 is amended by adding new paragraphs (l) and (m) to read as follows:

§ 146.24–55 Stowage of compressed gases with explosives and other dangerous articles.

The stowage of compressed gases with explosives and other dangerous articles shall conform to the following conditions:

* * * * *

(l) Flammable compressed gases shall not be stowed in the same hold or compartment with radioactive materials.

(m) Nonflammable compressed gases shall be stowed away from (i.e., with intervening cargo or ship's structure) radioactive materials.

Subpart 146.25—Detailed Regulations Governing Poisonous Articles

36. Section 146.25–1 is revised to read as follows:

§ 146.25–1 Definition of poisonous articles.

(a) Poisonous articles for the purpose of Parts 146–149 are divided into three classes according to degree of hazard in transportation. These are:

Extremely dangerous poisons—Class A.
Less dangerous poisons—Class B.
Tear gases or irritating substances—Class C.

(b) These poisonous articles are defined by the Department of Transportation regulations as set forth in §§ 146.25–5, 146.25–10, and 146.25–15 and such definitions are binding upon all shippers making shipments of poisonous articles by common carrier vessels engaged in interstate or foreign commerce by water. These definitions are accepted and adopted and form part of the regulations in this subchapter and apply to all shippers making shipments of poisonous articles by any vessel and shall apply to owners, charterers, agents, master or other person in charge of a vessel and to other persons, transporting, carrying, conveying, storing, stowing, or using poisonous articles on board vessels subject to R.S. 4472, as amended (46 U.S.C. 170), and the regulations in this subchapter.

37. Section 146.25–10 is amended by revising the introductory text of paragraph (a) to read as follows:

§ 146.25–10 Less dangerous poisons, Class B, liquids and solids, poison label.

(a) Poisonous liquids or solids (including pastes and semisolids), other than Class A or C poisons, which are known to be so toxic to man as to afford a hazard to health during transportation, or which, in the absence of adequate data on human toxicity, are presumed to be toxic to man because they fall within any one of the following categories when tested on laboratory animals:

* * * * *

§§ 146.25–20, 146.25–21, 146.25–23, 146.25–25, 146.25–30, 146.25–35 [Revoked]

38. Sections 146.25–20, 146.25–21, 146.25–23, 146.25–25, 146.25–30, and 146.25–35 are revoked.

39. Section 146.25–40 is revised to read as follows:

§ 146.25–40 Limitation of "On deck" stowage.

When "On deck in open" stowage is permitted for any substances by §§ 146.25–100 to 146.25–300 inclusive, it shall apply only to such substances packaged in waterproof packaging.

40. Section 146.25–45 is revised as follows:

§ 146.25–45 Stowage of poisonous articles with explosives and other dangerous articles.

The stowage of poisonous articles with explosives and other dangerous articles shall conform to the following conditions:

(a) Packages of poisonous articles offered for transportation on board vessels shall, when taken on board a vessel, be stowed in accordance with the provisions applying to the particular character of vessel as shown in §§ 146.25–100 to 146.25–300 inclusive, and with the detailed regulations for stowage in this subpart.

(b) Poisonous articles shall not be stowed in the same hold or compartment with Class A or Class B explosives.

(c) [Revoked]

(d) Poisonous articles shall not be stowed in the same hold or compartment with flammable liquids.

(e) Poisonous articles shall not be stowed in the same hold or compartment with flammable solids.

(f) Poisonous articles shall not be stowed adjacent to or under packages of corrosive liquids. Cyanides, or cyanide mixtures shall not be stowed in the same hold or compartment with corrosive liquids.

(g) Poisonous articles shall not be stowed in the same hold or compartment over cylinders of nonflammable compressed gases.

(h) Poisonous articles, Class A and Class C shall not be stowed in the same hold or compartment with cotton.

(i) Packages of poisonous articles shall be stowed well away from living quarters and ventilation ducts serving living quarters.

(j) Packages of poisonous articles shall be stowed well away from foodstuffs. The phrase "away from" means that the stowage may be in the same hold or compartment but must be separated in such a way by distance and other cargo so that in event of leakage or damage to packages the poisons will not contaminate the foodstuffs. The following additional requirements shall apply to the stowage of poisonous liquids and solids, Class B, and foodstuffs:

(1) If the foodstuffs are in airtight nonpermeable packaging, these poisons may be stowed "away from" the foodstuffs.

(2) If the foodstuffs are in bulk or are packed in bags or wooden barrels, these poisons shall be stowed in a hold or compartment that is separated from the foodstuffs by a tight bulkhead.

(3) These poisons shall not be stowed on weather deck hatches over a stowage of foodstuffs in bulk or packed in bags or wooden barrels.

41. Section 146.25–50 is amended by revising paragraph (a) and revoking paragraphs (b) and (c) to read as follows:

§ 146.25–50 Care following leakage or sifting of poisonous articles.

(a) Compartments or holds in which have been stowed packages containing poisonous liquids and solids, Class B shall, in the event any leakage or sifting from the packages has occurred, be thoroughly cleaned after the cargo is unloaded and before the hold is used for stowage of other cargo.

(b) [Revoked]

(c) [Revoked]

§ 146.25–65 [Revoked]

42. Section 146.25–65 is revoked.

§ 146.25–400 [Revoked]

43. Section 146.25–400 is revoked.

Subpart 146.29—Detailed Regulations Governing the Transportation of Military Explosives and Hazardous Munitions on Board Vessels

44. Section 146.29–11 is amended by revising paragraphs (c) (11) and (15) to read as follows:

§ 146.29–11 Definitions and abbreviations.

For the purposes of the regulations in this subpart, certain words, phrases, and abbreviations are defined as follows:

* * * * *

(c) *Related terms.* * * *

(11) *Cargo transporter.* This term covers a noncollapsible, reusable steel shipping box of not over 135 cubic feet capacity, used for shipping separate items of cargo as a unit, and handled on board ship by "lift-on/lift-off" methods. Such container must conform to Military Specification MIL–B–11886 or MIL–B–21560. It is commonly referred to as "Conex Box."

* * * * *

(15) *Definitions of other dangerous articles.* For definitions of:

(i) Radioactive materials, see § 146.19–1.

(ii) Flammable liquids, see § 146.21–1.

(iii) Flammable solids and oxidizing materials, see § 146.22–1.

(iv) Corrosive liquids, see § 146.23–1.

(v) Compressed gases, see § 146.24–1.

(vi) Poisons, Class A, see § 146.25–5; Class B, see § 146.25–10; Class C, see § 146.25–15.

(vii) Combustible liquids, see § 146.26–1.

(viii) Hazardous articles, see § 146.27–1.

* * * * *

45. Section 146.29–59 is amended by revising paragraph (k) to read as follows:

§ 146.29–59 Stowage adjacent to other dangerous articles.

* * * * *

(k) *"On deck" stowage.* When packages of flammable liquids, flammable solids or oxidizing materials, corrosive liquids, compressed gases, poisons, radioactive materials, combustible liquids, or hazardous articles are stowed "On deck," such packages shall not be stowed within 12 inches of any steam pipe fitted on deck.

45. Section 146.29–90 is amended by revising the heading and the introductory text to read as follows:

§ 146.29–90 Use of cargo transporters (Conex Boxes).

Cargo transporters, complying with Military Specifications MIL–B–11886 and MIL–B–21560, may be used for the transportation of military explosives and hazardous munitions subject to the following conditions:

* * * * *

§ 146.29–99 [Amended]

47. In § 146.29–99, Chart A is amended as follows:

A. Revise the heading in column 1 to read as follows:

DOT Class.

B. Amend the entry "Rocket engines liquid" by deleting in column 1 the letter "A" and insert in lieu thereof "B".

(R.S. 4405 as amended, 4462, as amended, 4472, as amended, sec. 6(b)(1), 80 Stat. 938; 46 U.S.C. 375, 416, 170, 49 U.S.C 1655(b); 49 CFR 1.4(a)(2). Interpret or apply sec. 3, 63 Stat. 675; 50 U.S.C. 198; E.O. 11239, July 31, 1965, 30 F.R. 9671, 3 CFR, 1965 Supp.)

Dated: February 5, 1969.

W. J. SMITH,
Admiral, U.S. Coast Guard,
Commandant.

[F.R. Doc. 69–1717; Filed, Feb. 11, 1969; 8:45 a.m.]